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WHOLE No. 3199

NEW YORK, SATURDAY, JUNE 28, 1919

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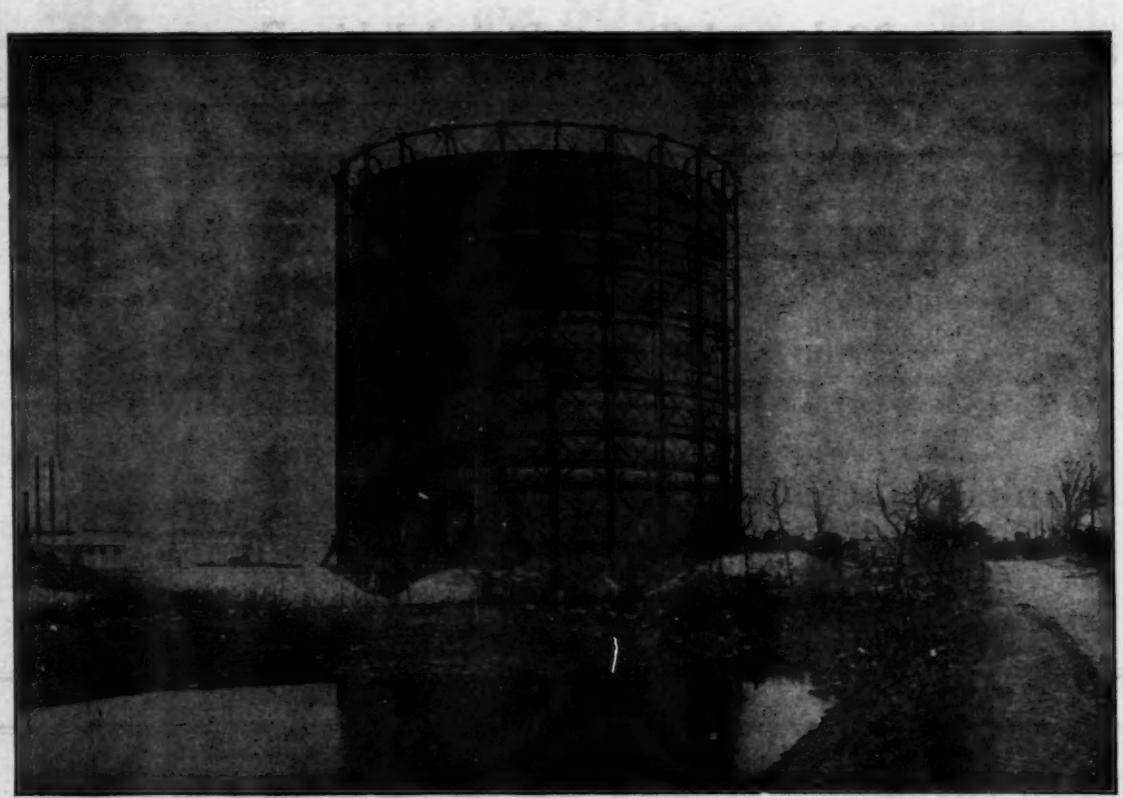

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# With the Generating Plant Representing Only Third of the Investment, Load Factor in the Gas Industry Becomes of Real Importance

## Means of Improving It — Classes of New Business Which May Be Obtained in Future — Their Various Effects Upon Load Factor

By THOMSON KING

Superintendent Fuel Sales, Consolidated Gas, Electric Light and Power Company of Baltimore, Baltimore, Md.

The term Load Factor, was, I believe, first used by electrical engineers, and was applied by them to the output of energy from their generating stations; but it is a most useful term and capable of application to the output or to the use of any commodity.

Load Factor may be defined as the ratio of the average to the maximum output, taken over some given period of time. This is, of course, a broad and general definition; to make it concise, we must add some qualifying word to denote the period of time considered as, daily, monthly or annual; we must also state what period of time is considered in measuring the maximum.

In this paper, except when otherwise stated, the annual load factor will be considered and the maximum output will be taken as the output during the maximum hour. This will be referred to as the demand.

This ratio, expressed by the term Load Factor, is of importance in industries, because it always exerts a greater or less effect on the conditions of operation and on the cost of production. It is of greatest importance in those industries, where the fixed charges are a large proportion of the cost of production and where the product must be consumed as it is produced; that is, when storage of the product is difficult or expensive.

To illustrate: Consider a clothing factory with a capacity of 100 suits per day; on some days no suits are sold; on others, sales may reach 1,000 or more. If we plotted a curve showing the sales day by day, it would have very high peaks, with very low places between them, but this makes little difference to the proprietors, because suits made on one day, may be easily stored and sold on another, and furthermore, the fixed charges on the clothing factory are but a small proportion of the total cost of production; labor and material are far greater. But, suppose it was necessary to make each suit on the day it was sold, then to provide for the days 1,000 suits were sold, the factory would have to be ten times larger, and on the days when there were no sales, it would be idle. Let us further suppose the greater part of the cost of a suit to be made up of interest, depreciation and other fixed charges on the plant, which are determined by its size and, continue whether it is busy or idle; we can imagine that the cost of suit production would be greatly increased and that the proprietor of the factory would spend a good deal of his time in endeavoring to make his daily sales steady and uniform, so that his plant be kept busy and earning its fixed charges.

In the commercial production and distribution of electricity, the cost of storing the product is prohibitive; it must be created the same instant it is used, and the ratio of fixed to operating costs is therefore very high. Whereas, most manufacturing industries send out an annual product, equal to or greater in value than the capital invested in the production, the central station's annual output is usually sold for less than one-seventh (1/7) of its invested capital.

### Conditions Were Different in the Gas Industry

The fact that they could not store their product and therefore must build and maintain their power houses large enough to take care of their maximum demands, made the producers of electricity study their load curves, and work earnestly to flatten out the peaks, and fill up the valleys; hence, years ago there appeared non-peak schedules, and for years, electrical load factors have been improving.

In the gas industry, conditions were very different; gas could be easily stored in holders and so the generating plant need have an hourly capacity, not determined by the output for the largest hour in the year, but by the average hourly output for the largest day in the year. It therefore seems to have been generally accepted that load factors were of no very great importance and little has been heard of it in the gas industry. It is, however, sometimes well to question generally accepted ideas, and some inquiry into and analysis of the facts of the case, will, I believe, be of considerable interest.

### Generating Plant Represents Only Third of Investment

We have said that the size of the gas generating plant could be determined by the maximum days, rather than by the maximum hour's output. This is true, until we reach the holder. The size of the holder and consequently its cost is determined by the maximum output into the distribution system; the size of the mains by the maximum demand of the territory each serves; the size of the services and meters by the maximum demand of the individual installations they serve.

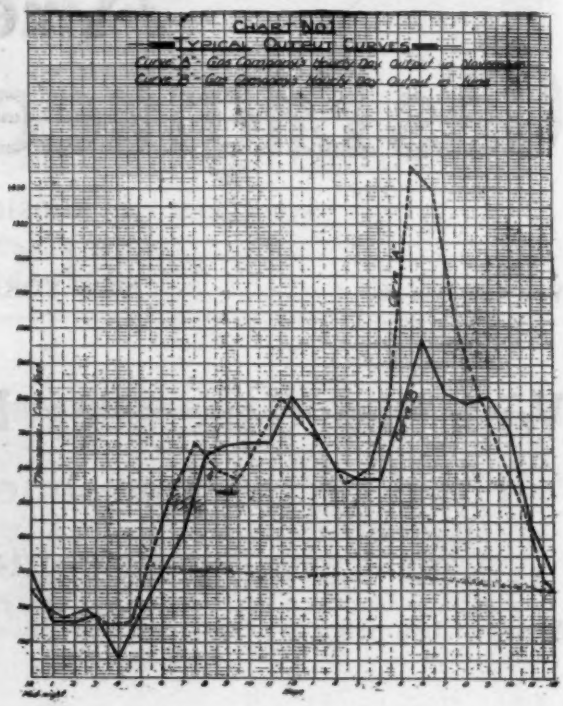
The gas making plant represents only about one-third of the investment necessary to make and distribute gas in most cities, so that the greater part of our total investment is affected by the maximum hourly demand, and therefore the magnitude of our interest and depreciation charges is largely determined by demand. Furthermore, many of our running charges are determined by the number of customers and not by what they use; for instance, meter reading, billing, complaint and general charges are about the same, whether a customer uses much or little.

On the other hand, the revenue under a flat system of rates is proportional to the average output. It therefore becomes apparent that the cost to us of gas delivered to the customer is largely determined by the maximum demand, and a nearly constant customer charge; while the revenue we receive is proportional to the average load. The ratio between the maximum and average output and the consumption per customer, are of vital importance to us; in fact, they will probably be the determining factors in deciding whether we show a profit or loss in our business.

### Individual Maximum Demands of Consumers Will Never Coincide

Having established the importance of load factors in the abstract, let us examine it with more regard to detail. We know it will be determined by our maximum hour's output, or peak load, and that this peak is made up of the individual demands of our customers, and our peak will occur when a great number of them wish to use gas at the same time. This brings us to the diversity factor, which must be understood and studied if we are to analyze our load factor.

The individual maximum demands of all our customers will never coincide, so our peak will always be less than the aggregate of the individual demands, and the number obtained by dividing the station peak into the sum of the individual maximum demands is spoken of as diversity factor. Thus, if we had a main feeding 1,000 houses, each with a maximum demand of 100 cu. ft. and we found the greatest demand on the main




to be 25,000 cu. ft. per hour, our diversity factor would be 1,000 x 100÷25,000=4.

If a company serves only one class of business, its customers will all want gas more or less at the same time, the diversity factor will be low and so will its load factor; but. if it serves many and varied classes of business, its diversity factor and load factor will be high It will be able to sell gas more cheaply and make more profit, than it could with a poor load factor.

Before attempting to prescribe methods for the improvement of load factor of any company it is essential that the company know accurately what its load factor and other load characteristics are; to do this it must have available records of its send-outs by days and hours; curves can then be plotted for maximum and minimum days send-out, for days of maximum hours and for the months showing daily send-outs and for the year showing monthly totals.

These curves make a very interesting study; in them we see reflected the effects of both natural and artificial causes, the shortening and lengthening of the hours of daylight, the extra cooking and lighting connected with the Christmas season. The variations of temperature and of industrial activity.

Fig. 1 shows two typical daily send-out curves. Curve 1 is for a day in the early part of November. We see the cooking of breakfast in a small peak, the preparation of the midday meal produces a larger peak, while we have the real peak of the day from 5 to 7 p. m., when the cooking of the evening meal overlaps the lighting. This does not occur in summer. Curve 2, Fig. 1 shows a typical summer day, the breakfast peak has disappeared, because people are not eating as much hot food and are not heating up their rooms; we still see the cooking of the midday and evening

meals, but since the preparation of the latter does not overlap the lighting load we have no high peak as in winter when darkness comes early.

So much for our present load. Let us now turn to the consideration of the new business that we may obtain in the future. We first note that it falls naturally into several fairly distinct classes, the most important of which are:

Domestic Lighting.
Street Lighting.
Domestic Cooking and Laundry Work.
Domestic Water Heating.
House Heating.
Industrial Applications.

We will briefly examine each of these and if possible, ascertain and predict its effect upon our load factor.

### Domestic Lighting

In the past, the lighting load has been the greatest factor in gas output, but in the future we may look for a gradual decrease of its relative importance; first, because nearly all new houses are wired for electricity and it is used for lighting, and many old houses are being wired and electricity supplants gas in these; second, because the open flame burner is constantly being supplanted by the mantle burner, with its greater efficiency and lower consumption. The effect of the lighting load will therefore be negative, or the effect of a decrease, but since the lighting load has the poorest load factor, and is the cause of our peak, its decrease will tend to improve the general load factor. Street illumination is high load factor and desirable business, and it will probably remain about stationary in amount for some time

### Domestic Cooking

The daily cooking load has three peaks or humps. We may get a fairly accurate picture of this load by plotting our company's send-out for a Sunday in summer. On such a day there is, of course, no heating and very little commercial and industrial gas used. The shape of the curve is therefore determined largely, by the cooking that is being done in the city. It will, however, not be quite representative of the cooking on an average day, because on Sunday the midday meal is much larger than the other two and this tends to distort our curve by giving us a great peak at midday.

The tendency in new houses and apartments is to leave out the coal range altogether; this means gas cooking the year round and consequently an improving load factor. As time goes by, gas domestic cooking will supplant all other forms and become universal where gas is available at a reasonable price. This will increase the summer Sunday peak, but it will never assume dangerous proportions. Laundry work is non-peak business, and very desirable. The fact that it is nearly all done on Monday and Tuesday somewhat restricts its diversity factor.

### Water Heating

This is business of the widest diversity factor, and hence, very desirable. It should be cultivated and fostered to the fullest extent. Better attention should be paid to securing large water heating installations in apartment houses and institutions. In some cases these installations will be only operated during the summer months, and the water will be heated from the main building heating system during the winter. This business being on in summer and off in winter will help to balance a preponderance of house heating business which the company may carry during the winter.

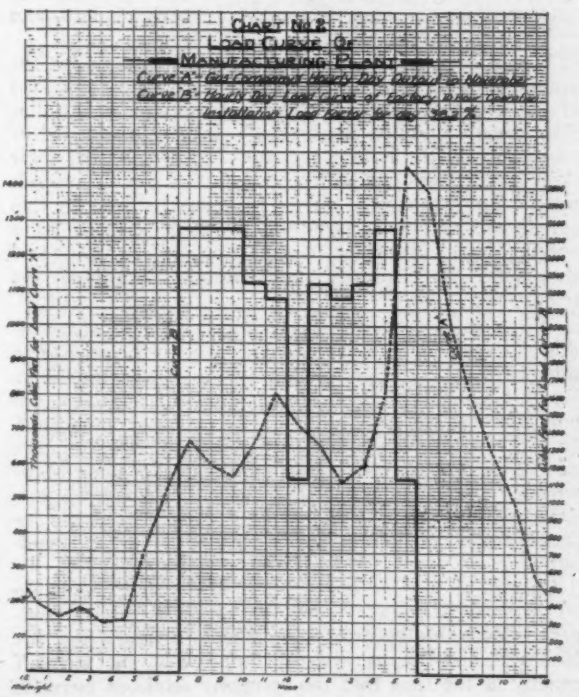
### House Heating

This may be divided into two classes: Auxiliary heating, which is used to supplement coal during the spring and fall; and complete or independent heating, where the whole house is heated for the entire season with gas.

Of these two classes, the most desirable from the viewpoint of load factor, is the residence using gas entirely during the early and late part of the heating season, and to help the coal heating plant during the winter, as this will give us long use and no great demands, since there will be no peak consumption to heat the house in zero weather, and there will also be the possibility of a fair diversity among customers in this class.

Gas that is used for house heating only in the spring and fall and is entirely discontinued when the coal fired heating system is started, for the colder part of the season, has a rather poor load factor because its season of use is short.

Where the whole house is heated for the entire season, we will have high peaks and very little diversity, as all our customers will be affected by one thing, the weather. This business, however, will not come rapidly at the present prevailing rates, because of the cost of



gas in excess of coal; and it is improbable that most companies selling artificial gas will obtain enough of it to seriously affect their load factors.

### Industrial and Commercial

We will include under this head, applications of gas to all commercial and industrial properties and processes and also to its use in large institutions, such as hospitals and asylums, although they may not be of a strictly commercial nature; in short, we mean to include all gas used outside of residences and street lighting.

This is the richest field open to the gas company; it is at present largely undeveloped, and holds tremendous possibilities in the volume of sales to be made, in density of load as far as distribution is concerned, and in diversity of demands; therefore, we may look to it for profitable and high load factor business.

The high load factor of this business may be very clearly shown by giving the average load factors of various classes of customers; these load factors have been determined by actual measurements of demands and furnish data hitherto unavailable, as far as the writer has been able to find out. They are all taken from large consumers, that is, customers with an average monthly consumption of 80,000 cu. ft. or over.

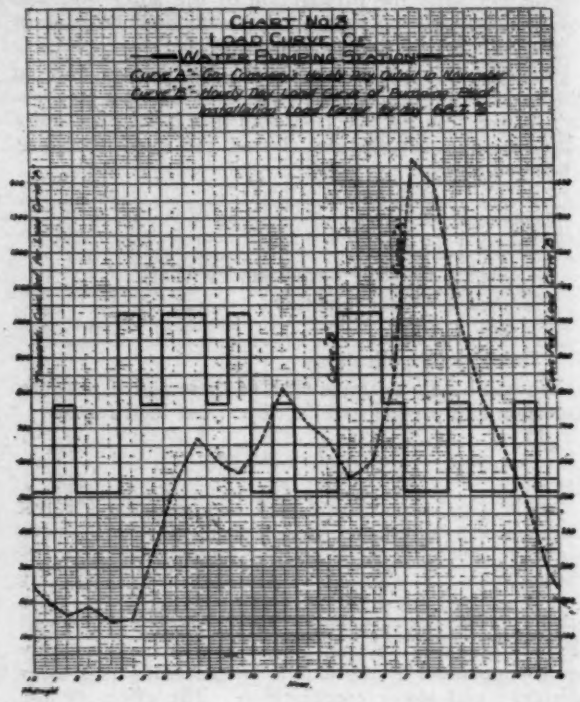
LOAD FACTORS OF LARGE INDUSTRIAL AND COMMERCIAL CUSTOMERS

| Class | Number in Class | Aver Load Factor | Min. and Max. Class |
|---|---|---|---|
| Hospitals | 8 | 31.1 | 23.7—37.9 |
| Hotels | 6 | 26.7 | 28.3—44.9 |
| Clubs | 3 | 34.6 | 32.6—38.2 |
| Can manufacturing companies. | 6 | 21.3 | 14.2—34.7 |
| Lunch rooms and restaurants.. | 7 | 37.6 | 29.9—45.8 |
| Newspapers (morning and evening) | 2 | 46.5 | 32.5—60.6 |
| Coffee roasting | 2 | 21.9 | 20.6—23.3 |
| Miscellaneous factories | 9 | 28.0 | 20.0—38.2 |

It will be a great help to any gas company with the ambition to improve its load factor, to study the load characteristics of the industrial and commercial installation already upon its lines, or which may be secured as customers. This is best accomplished by plotting their daily load curves just as we have plotted the daily send-out of the company itself. The curves shown in this article are obtained from graphic records made by a special device attached to the customer's meter, and they show the customer's consumption throughout the twenty-four hours.

When we investigate these daily load curves of industrial and commercial customers, it is surprising to find what a large proportion of them are non-peak. By this I mean, that their heavy use of gas does not coincide with the peak hours of the company's send-out. In the type of curves shown herewith, the daily curve of the customer has been plotted on the same sheet with a typical company's send-out curve for a winter's day, and this method shows very clearly how the industrial and commercial load will affect the total send-out.

Chart 2 shows the load of a typical factory working 10 hrs. per day. It shows that this industrial business is desirable because it represents a steady use for 10 hours, and because the consumption of gas falls off exactly at the time that the company send-out curve is




rising most rapidly, and when the main capacity is needed to meet the demand of the daily peak.

Chart 3 shows a typical 24-hr. load. This is the curve taken from a pumping plant supplying a city water system, and using gas engines for power. This chart shows a steady use of 500 cu. ft. of gas for every hour of the 24, with the use running up to 1,000 cu. ft. during certain periods. This is not non-peak business as the heavy use may coincide with the company peak.

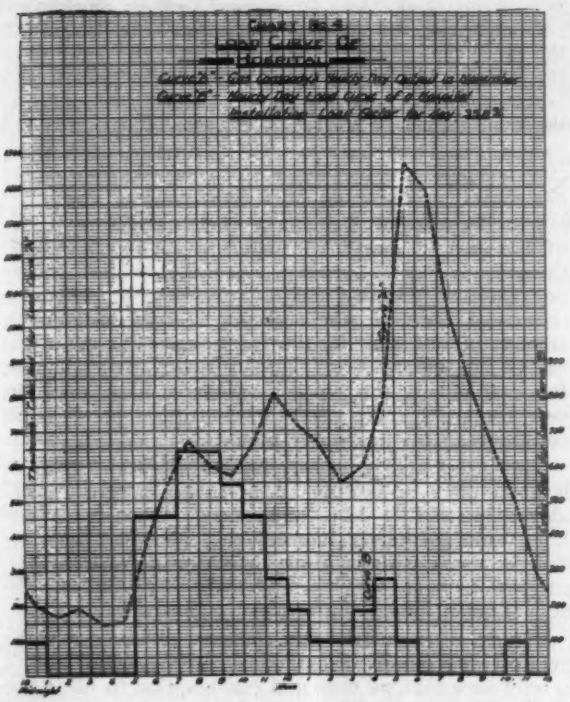
Chart 4 shows the consumption for a large hospital. This is fairly long hour use and is very satisfactory business, because it is distinctly non-peak.

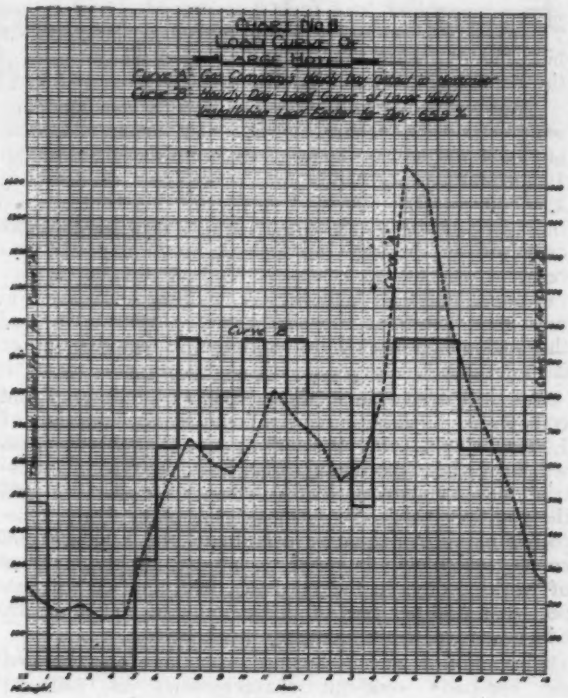
Chart 5 snows the use of gas in a newspaper plant where morning and evening papers are published. This strongly resembles the chart from the pumping plant, but is even more regular in its continuaus use throughout the 24 hours, and has the extremely high load factor of 77 per cent.

Chart 6 shows the use in a large hotel doing all its cooking by gas. Here we see a steady use of gas for 20 hours out of the 24. This load, however, is not quite so favorable as the other, in that it is as high during the company peak as at any other period.

Chart 7 shows the very favorable load of a Chinese restaurant. This also has a fairly high use of gas during the company peak, but it uses gas steadily for about 15 hours of the day, and has a fair use of gas after midnight which is the time when the company send-out is lowest, and the point at which we need consumption to fill in the valley and improve the load factor.

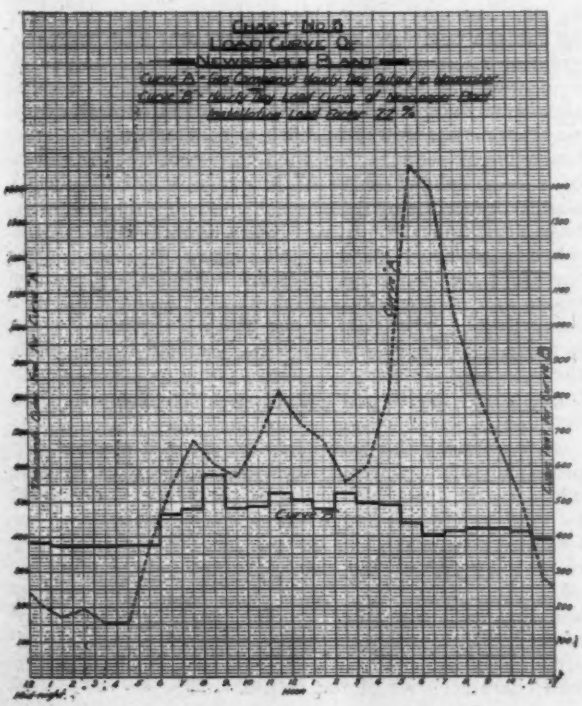
In the loads just studied there is practically no lighting; therefore, there will be no shifting of their peaks, due to the shortening of the days in winter, and there will be a large diversity factor as far as seasonal variations affect the different industries; so that the com-

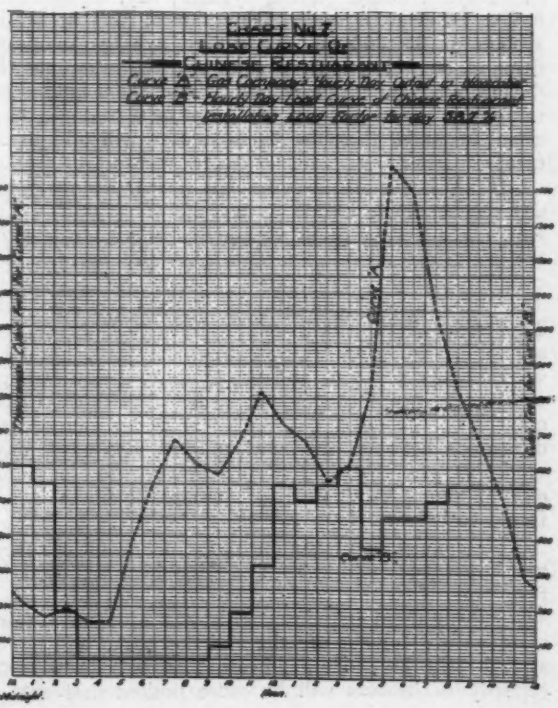




bined consumptions and peaks of industrial loads will probably be fairly constant throughout the year. These facts combine to make business having such characteristics most desirable for the improvement of our load curves and the increase of our revenue.

The writer has analyzed a number of typical industrial load curves and by the use of a selected number found that they represented a total consumption of 92,700 cu. ft. The sum of the individual peak hours was 7,640 cu. ft. The combined peak hour was 6,800 cu. ft., and occurred between 7 a. m. and 8 a. m. The combined load factor was nearly 58 per cent. The





greatest combined load for 1 hour between 5 p. m. and 7 p. m. was 2,650 cu. ft. This makes the largest combined hour during the company peak 2.86 per cent of the combined consumption for the day.

Now let us suppose that we have a gas company with certain load characteristics; say, an annual send-out of 4,500,000,000 cu. ft. maximum day send-out of 19,000,000 cu. ft. and a maximum hour send-out of 1,500,00 cu. ft. The load factor of this company on the basis of the maximum hour will then be 34.2 per cent and on the basis of the maximum day 64.9 per cent. This company is anxious to determine in advance the effect upon its load factor, its maximum day and maximum hour; of the addition of large amounts of the various classes of business that it is possible for it to secure.

We will first assume the addition of industrial and commercial business having an annual consumption of 1,000,000,000 cu. ft. We will assume that this business will have the same characteristics as the typical industrial and commercial loads just mentioned. To find the addition which this busnness will make to the company's maximum day, we will divide the 1,000,000,000 cu. ft. which will be used each year, by the number of working days in the year, say, 300, and we will expect that 2.86 per cent of this amount of 95,000 cu. ft. will be added to the company peak hour.

The addition of this business has therefore changed the company send-out characteristics as follows: Maximum day 19,333,000; maximum hour 1,595,000 cu. ft. Load factor on hourly basis 39.3 per cent, load factor on day basis 66.5 per cent. The addition of the industrial load has considerably improved the company load factor.

We will now examine the effect of the addition of the same volume of house heating business, consisting of complete house heating systems, say, 3,000 houses having an average total consumption during the heating system of 330,000 cu. ft. and an average maximum demand of 300 cu. ft. per hour each. Assume that during our company peak hour, these 3,000 houses will use gas at the rate, equal to 60 per cent of their maximum demands, then the 3,000 houses will add to our company peak hour, 540,000 cu. ft., making it 2,040,000 cu. ft. We will also assume that during the maximum day the houses will burn an average of 12 hours. This will add a consumption of 10,800,000 cu. ft., making the companys' maximum day 29,800,00 cu. ft. The company's hourly load factor is therefore reduced to 31.5 per cent and the daily load factor to 50.5 per cent. The effect of this business has been to increase their annual send-out 22.8 per cent. The peak hour has increased 36 per cent and the maximum day 56.8 per cent, and since this gas will all be used during seven months of the year, its effect will be to increase the difference between the average and maximum day's send out, and between the average and maximum month, unless some form of summer business can be found to balance it.

Now consider an addition of 1,000,000,000 cu. ft. of gas heating consisting of auxiliary heating, used before and after the coal systems are started, and to supplement them in winter, this will give us a fairly constant use for six months and the peaks will not be as bad as in the entire gas heating systems, because the capacity of heaters will be more limited and the diversity factor greater. Assuming that on our day of company peak, the use is 1,000,000,000÷6 x 30 and that the use during the peak hour will be 1/18 of the day's use. This will add 308,000 cu ft. to the company peak hour. making it 1,808,000 cu. ft., and 555,000 cu. ft. to the maximum day making it 24,550,000 cu. ft. The hourly load factor becomes 34.7 per cent. This auxiliary business has had little effect on the hourly, but has slightly reduced the daily load factor.

In order to show the relative effect of various classes of business on our load factor, we have considered them singly, but in actual practice, the addition of any one class of business will usually have an effect on other classes; thus, the addition of any considerable amount of residence heating will mean that many gas ranges and water heaters that formerly were abandoned for coal during the heating season, will be used the year round; this will tend to still further increase the consumption in the winter months.

The direct and secondary effects of the addition of large volumes of heating business will therefore probably be to slightly decrease the load factor, but at the same time to greatly increase the sales per customer and per meter without a proportionate increase in company investment, which would make it profitable business if taken under the proper system of rates.

Finally, the industrial and commercial field offers the greatest opportunity for off peak business, and also it is only here that we may find consumption to fill in the great valley in our load curve between 8 p. m. and 6 a. m. Some industries such as bakeries, can use gas during these hours and they should be secured by careful study of efficient methods of applying gas to their needs and liberal rates.

We may conclude with a brief summary of the results that are to be reached from the data we have just presented. Of all the business which can be secured by gas companies, the industrial and commercial has by far the best load characteristics, and will have the greatest effect in the improvement of the company's load factor and operating conditions. This business should be sought and fostered and encouraged in every way within the power of the gas companies. It is the best paying business that they can secure. The effect of a large volume of house heating business will be to slightly lower the load factor, calculated upon an hourly basis, and to lower it to a somewhat greater extent when calculated on the daily basis. It should not, therefore, be sought in unlimited amounts, but can be taken on with other business, and thereby made to yield a fair profit. The effect of the heating of whole houses is more pronounced in decreasing the load factor, than the effect of auxiliary heating. The two considered together will probably be better than the effect of either considered separately.

In conclusion the writer has endeavored to illustrate principles, and point out methods, rather than to deal with any abstract quantities as these are determined by local conditions both natural and artificial, such as location with regard to latitude and character of the community served, but the important point is that to all, gas companies load factor is of very vital concern, and that each company should make a careful survey of the business within its reach, taking into most careful account the effect of each class of that business on its load characteristics of the future.

# Eight Million Cu. Ft. of Manufactured Gas Burned in a Few Seconds, Lighting Up All London

## H. Townsend Describes Effect of German Naval Shell Fire and Aerial Bombs Upon Gas Works of England — In Hartlepool, Though All Gas Holders Were Put Out of Action and the Whole Place Littered with Debris, Service Was Re-established in Less Than Sixty Hours After Bombardment Occurred

Sheils from the sea and bombs from the air battered gas works in England's congested sections, smashed distribution mains in populated streets, set fire to vast quantities of escaping gas, but beyond that did little more than confirm the view that the safest plan under war conditions with the prospect of bombing and shell fire imminent, is to keep the mains charged with the lightest pressure necessary for the purpose and that property surrounding gas holders has little need to fear being devastated by the tremendous explosions the public mind so often pictures as possible, according to H. Townsend, in a report he submitted to the British Institution of Gas Engineers in London, at its recent annual convention. Mr. Townsend told of some seventeen district gas plants that suffered damage in air raids, bombardment from enemy ships and explosions which affected many gas works. The most serious instances were at Hartlepool, Gorleston, Retford, Bradford and Greenwich (England). The following is a digest of Mr. Townsend's very complete description of the damage sustained to the works at these places:

### The Hartlepool Gas & Water Company of Hartlepool.

The company has three gas holders which are very prominent objects viewed from the sea. These afforded an excellent target for the enemy gunners in a bombardment by three first-class German battle cruisers which was launched on Hartlepool without much warning one morning at 8 o'clock, on Wednesday, Dec. 16, 1914. Many buildings were wrecked and several hundred people were killed and maimed. Within the first two or three minutes of the bombardment, shells were seen splashing into the timber docks adjoining the No. 1 gasworks, and scattering the timber stacks and pit-props in the timber yards in all directions. By 8.15 a shell had pierced the crown, near the center, of holder No. 2—a two-lift, column-guided holder, 140 ft. diameter, 750,000 cu. ft. capacity, erected in 1879. At the time the holder was more than two-thirds full. The gas ignited at the rent made in the crown, and huge roaring flames shot up into the sky. In about fifteen minutes the holder was down on the rest-stones; but the flames continued under the crown for over two hours before being finally extinguished. Three of the roof trusses were badly damaged, and 285 holes pierced in the sides and crown from within by the fragments from the bursting shell.

In the meantime the smaller holder, No. 1—a three-lift spiral-guided one—had been struck by a shell, which made a jagged hole about 14 in. in diameter where it entered one of the top row of plates just below a guide rail, pierced the center column upon which the crown rests when the holder is empty, and fragments then passed through the opposite side of the top lift, making 140 holes. No one appears to have actually seen this holder on fire; but if it did catch fire, the flames were evidently extinguished by the descent of the holder into the tank, which would be quite possible, as there were no holes in the crown. Another shell struck the east end of the retort house gable adjoining No. 1 holder, the fragments piercing the foul main and ascension pipes in the retort house in various places. Another landed into the coke heap in the back yard on the north side of the retort house named.

The heat of the flames from the burning No. 2 holder melted the flashing and lead gutters on the office roofs adjoining, and scorched the slates in places, so that they crumbled when handled, and had to be renewed.

As the attacking ships moved round to the north, the No. 2 gas works came more directly under fire, but the only serious damage done was to the three-lift column-guided holder, 150 ft. diameter, capacity one and one half million cu. ft. This holder is the most prominent one of the three as seen from the sea, and at the time was well up into the third lift. It was struck by three shells, and from the fragments afterward found, they were evidently 11.2 in. shells. The first shell struck the dip of the outer lift and passed right through the middle lift cup, making a hole about 14 in. by 11 in. The second shell hit the top curb angle immediately on the root of it, and then burst, sending the curb of the holder inwards for a whole bay, and ripping the top sheets open very near to the crown plate. The gas fired, buckling the sheets on the top and sides of the holder, and twisting the whole of the inside framing about 2 ft., one of the uprights in the outer row being broken and a number of the wood purlins destroyed by fire. Most of the top carriages were put out of their guides. The third shell hit one of the standards about 20 ft. from the top, carrying part of the standard away. Two more of the standards and eight or nine of the girders were badly bent and twisted by the heat from the fire which followed. Beyond glazing, and damage of a minor character from splinters, the purifiers and other plant and buildings did not suffer very materially; the inference being that the enemy "went for" what was prominent in the towns.

But two towns, and considerable outlying districts, with a population of at least 90,000 and extensive engineering works, were without gas. The situation to be faced was as unique as it was unwelcome. However, in less than two hours from the time the bombardmen began the company was in touch with two firms of specialists, who immediately rushed their men to the disabled works. They commenced to make temporary repairs to the No. 2 holder, which was the only one of the three at all possible to patch. With the assistance of the local steel works, they managed to obtain six new plates for the crown; and all available hands were

engaged at the same time repairing the other holes in the crown.

As soon as the crown was made good they commenced to lift the holder with gas, and patch the holes in the sides as it rose—a very unpleasant, difficult task, as they were obliged to make a large percentage of water gas in order to get the holder up quickly. A number of the men were temporarily laid out from the ill effects of it. By 6 o'clock on the Friday night (less than sixty hours after the bombardment) the gas supply was resumed; but it was some months before the other two holders were available. A number of people in the high part of the town were not without gas during the sixty hours the supply was cut off at the works.

The unwelcome visitation was not without its humorous side; for it was unusual to see the engineering staff in the drawing office without a window intact in the place, overcoats on, seeking out drawings to aid in procuring materials for reinstatement of the damage. In conclusion, the company says, one remembers with gratitude the whole-hearted desire of neighbors in the profession who proffered help, and came quickly upon the scene with that intent, and the loyalty and devotion of their own staff and workmen.

The Hartlepool Gas & Water Company on three occasions was the scene of Zeppelin raids, but fortunately at these times the company's property suffered nothing worse than broken windows, even though bombs were dropped near to the gas works.

### The Air Raids

The air raids consisted roughly of two series. The first series comprises the Zeppelin raids. During these raids the bombs dropped were mostly of the incendiary type; but explosive bombs were soon found to be more effective, and as the war proceeded these bombs were of progressively heavier type. In London it was not uncommon while a raid was in progress to receive six or more reports of escapes of gas within half an hour. The Gas Light & Coke Company of London stationed men at their various sub-offices during raids, and as many as ten motors were in readiness to carry these men and tools wherever damage might happen to be reported. One of the chief sources of anxiety to this company from air raids were gas mains in the subways, In the company's area of supply there are nine miles of subways, in which are fourteen miles of mains, varying in diameter from 48 in. downwards. However, the London Company was very fortunate, for though there were many narrow escapes, no main larger than 12 in. diameter was damaged and in only one instance was the work of repair complicated by the escaping gas being fired; and the most troublesome repair was one which involved the bagging off of four mains before the escaping gas, which had fired, could be stopped.

The second series of raids were made by aeroplanes. There were thirty-one of these raids of which warning was received and damage was done to mains and services on sixteen occasions.

### Zeppelin Raid and Dreadnought Bombardment at Gorleston, Great Yarmouth

On the evening of April 24, 1916, at 9 p. m., notice was received to take air raid action. During the night the noise of bombs dropping was heard, but none were dropped near the gas works. At 3 a. m. terrific gun firing started; shells began whizzing through the air in pretty fast succession, and it was evident that they were dropping in the vicinity of the gas works. The gas works at Gorleston are on the river banks and immediately on the opposite side of the river is a tall electric-light shaft, which was being used by the enemy as a target. The electric light shaft escaped; but the gas works received the shells, which were of the high explosive class, and were being fired from German Dreadnoughts. The following is the gas company's own description of the damage sustained from the bombardment:

"When firing ceased, we at once decided to tackle the No. 1 holder, which was hit in the crown, and into which all the make was going. This holder is of 60,000 cu. ft. capacity, and had been struck in two places in the crown. A tongue of flame some 12 ft. high was shooting upwards. Unfortunately, the shape of the punctures caused the flame to impinge upon the guide column, carriage and wheel, and we feared the holder might thus lock itself. A good number of employees were soon on the spot to render what help they could, and it was evident that the best method to extinguish the flame was to smother it. To this end a supply of brick and plastic clay was hoisted on to the crown of the holder, and the assistant to the company, who had some twenty-five years' retort patching to his credit, undertook the task. The holder was fast burning itself aground, and it was therefore a race against time to avoid this happening. Getting as near as the intense heat would permit, he first encompassed the extent of the damage, and, by carefully building inwards, was able finally to smother the flame with clay. This operation in all occupied about three-quarters of an hour, during which time the No. 3 holder (200,000 cu. ft. capacity) was also burning furiously.

"Having extinguished the flame at the No. 1 holder, No. 3 was taken in hand. In this case a portion of a shell had hit the holder on the third sheet from the top, driving the piece of the plate inwards. It continued its path right through the holder, leaving on the opposite side at a distance of 4½ sheets from the top, or 1½ sheets lower than the point of entry. It was found when the holder was undergoing repairs that no internal damage had been done to the framing, etc. Gas was issuing from the hole on the inward path, but at the outward path it had fired. The intense heat had distorted the guide bracings, platform, and rail. By the time this holder was reached, the hole at which it had fired was almost down to water line, which was touched in about ten minutes. Upon reaching water, the flame was extinguished, but still left gas escaping at the point of entry.

"As about 120,000 cu. ft. of gas was lost, or just half the stock held prior to being hit, it was necessary to get this hole patched at once if the supply was to be kept going. The hole was roughly stopped while a square of ⅛ in. plate was worked to suit the irregular condition of the sheet caused by the entry of the shell fragment. The method of patching adopted is shown by the back view of the patch (No. 4), as shown in the photograph. Having everything ready, with the gas on us, the cross-bar was inserted inside the holder. The bolt had a length of string attached to it, and was the means used for keeping the cross-bar and bolt in position. The patch plate having a hole to suit the bolts, was passed over the string, and with a red lead joint the patch

was gently pressed home; the string still holding the cross-bar until the nut and washer had started to grip. The other hole in this holder being sealed, attention was next directed to two holes in the crown of No. 1 holder. These were patched in the same way as above described. Thus by dinner-time three holes out of four had been satisfactorily patched, and as all concerned had then been on duty from 9 p. m. the previous night, it was decided to leave the fourth hole, already sealed in the tank, until the next day, since by this time all were more or less suffering from the effects of the gas, which it was impossible to avoid inhaling."

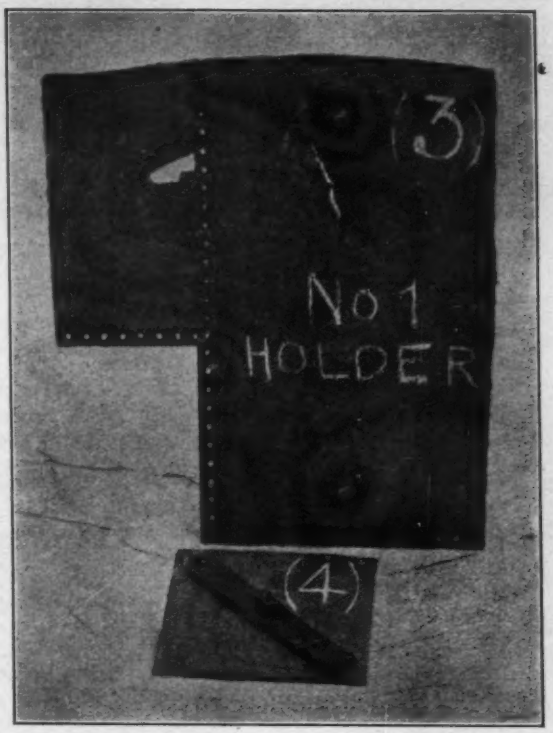
### Zeppelin Raid at Retford

Shortly after midnight on the 3-4 of September, 1916, the city of Retford was visited by a Zeppelin. It unloaded its first bomb about a mile away from the gas works. Then dropping about twelve bombs, the Zeppelin changed its direction and made a straight line for the gas works, unloading about fifteen bombs, of which two fell in the gas works' premises. The first of the two bombs fell in a tree between the manager's house and the largest holder, making about 300 holes in this holder, capacity 210,000 cu. ft., which was full. The second bomb dropped at the edge of No. 2 holder, with a capacity of 135,000 cu. ft., which was also full, making a large hole in the side sheeting; the sheeting being blown up into, and twisting round the roof trussing of the holder. Splinters from this bomb also went right through the holder, causing considerable damage to small holder (No. 3). The gas immediately ignited in all three holders: and the light of the burning gas was seen as far as forty miles away. The valve room, situated close to the No. 2 holder, caught fire, which was fortunately got under control after playing on it with water, for a considerable time, and the holders burned themselves out. The doors of the fitting shop and pipe stores were blown in by the force of the explosion, but the buildings did not catch fire. The next morning the works presented a pitiable sight. The small holder was patched as quickly as possible, and the supply of gas was commenced in nine days.

### Explosion at Bradford

The gas works at Bradford are situated near the Low Moor Chemical Company, Limited. The gas works and the Chemical Company are owned by the Bradford Corporation. The Chemical Company is situated near the side of a triangle formed by a junction and a loop line connecting two lines of the Lancashire & Yorkshire Railway Company. On the other side of this triangle and close by the railway are the gas works. The works consist of a retort house containing 156 retorts, with exhausters and the usual purifying plant and two gas holders—a single lift, 100 ft. diameter, of 180,000 cu. ft. capacity, and a three-lift, 80 ft. diameter, holding 270,000 cu. ft.

At 2.25 p. m. on Monday, 21st August, 1916, a terrific explosion occurred at the chemical works, and explosions continued at intervals until nearly 6 p. m., and numbered twenty-two in all. The most unfortunate result was that thirty-eight persons were killed and many injured—six of the former and twelve of the latter being firemen. The first explosion, though not the most violent, had the most disastrous effect of any on the gas works. Both holders were well filled at the time. The manager of the works was walking towards the holders when the first explosion occurred, and he was thrown to the ground. On recovering his feet, a very few seconds afterwards, both holders were grounded. The three-lift holder had its crown torn open outwards, the bottom curb of the inner lift was damaged, the side sheets of the middle lift were torn and buckled, and those of the outer lift were badly buckled and torn. The roof trussing was seriously displaced and damaged, and most of the vertical channel stays were buckled. The holder is situated about 275 yards from the scene of the explosion. The single-lift holder crown was torn, but not so badly as the other one. The side sheets, especially on the side nearer to the chemical works, were torn and buckled very badly, and the roof trussing was very seriously damaged. In both holders the guide-framing was not injured; but it was necessary to plumb and adjust it.




PATCHING A HOLDER AT CORLESTON

The various buildings on the works were all more or less damaged—slates were displaced on every roof, scarcely a window or skylight was left whole (these were all blown outwards), the smith's shop and boiler house (which were situated nearest the chemical works) were badly shaken, and the boiler flue also. The roof trussing of the coal sheds and retort house was damaged seriously—many king bolts and purlins being broken; the purifier house roof was lifted, the walls displaced in several parts, two principal rafters broken, and about 40 ft. of the ventilator with louvre boards blown away; and the offices and two dwelling-houses attached, with the furniture they contained, were very seriously damaged. Much of this damage to the buildings was caused by flying fragments, many of them very large, of the chemical works and plant.

Bricks were all over the gas works, and large pieces of castings weighing up to 1 cwt., wrought-iron piping (one 26 ft. length of 3-in. pipe was found), and torn portions of steel stanchions of great strength were distributed all over the works; and most of them were red hot when they dropped. Fortunately, only two of the gas department's men were injured, and these not seriously.

The district governors, of course, immediately grounded when the holders fell. The outlet valves were closed later in the evening, and valves on the distribution system (connecting the Low Moor district with Bradford) opened—so that those consumers remaining at home—and they were few—should not be deprived of a gas supply. Early next morning a number of inspectors were sent round to visit the whole of the unoccupied houses in the area covered by the explosion (these were many) and shut off the gas at the service taps, so as to avoid any possible leakage through damaged fittings, etc.

Some ridiculous reports of the explosion were current and some found their way into the daily press. One was to the effect that a gas holder explosion was the cause of the fire at the chemical works; whereas the fact was that the fire at the chemical works started ten minutes before the holders collapsed. The gas in the large holder did not fire at all; that in the smaller one was ignited by flying fragments from the chemical works after it had grounded. The holes in its crown were comparatively small, and the only signs of burnt paint seen were on the lower portion of one column, and close by the torn plates on the crown. The large holder crown sheets were torn outwards, and all the windows in the district were blown outwards, as glass could be seen opposite every window strewn right away into the middle of the road. These facts indicate that the damage was not caused directly by the explosions, but by the reaction or rebound afterwards, and the rarefication of the air the eruption created.

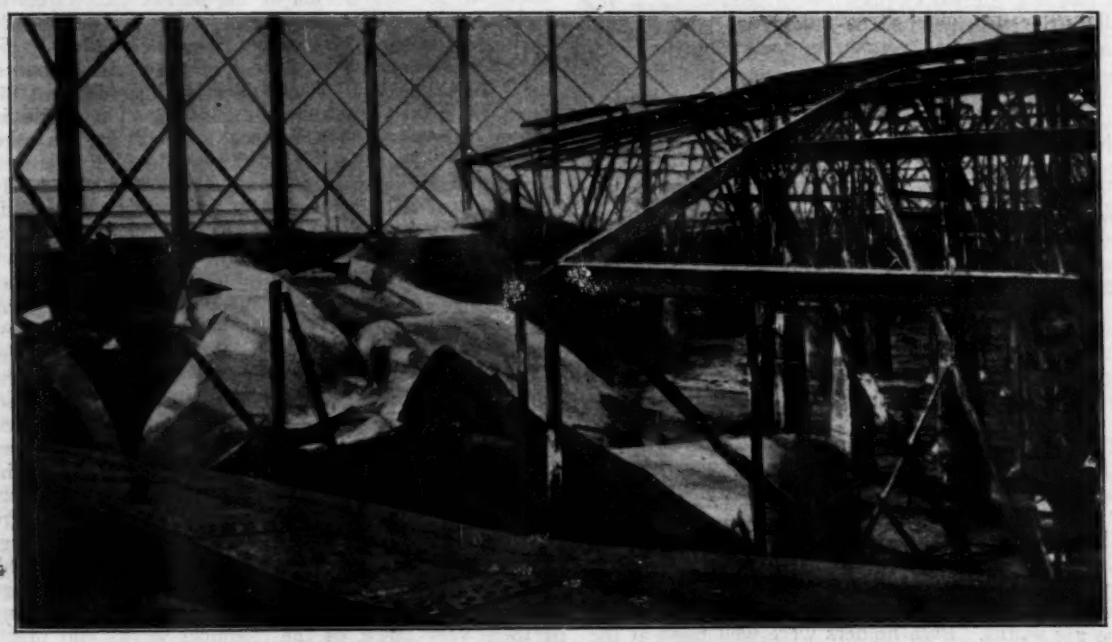
The builders of the larger holder were immediately communicated with, and the repair of the two holders put in hand at once; while syphons and pumps were got to work emptying the holder tanks. Owing largely to the delay in obtaining steel, the three-lift holder was not ready for use until the end of November, and on the 27th of November, 1916, gas making was resumed The repairs of the smaller holder were not completed until May 17, 1917.

### Silvertown Explosion Affecting South Metropolitan Gas Company Works at Greenwich

An explosion of a TNT works at Silvertown, 1½ miles distant from the works of the South Metropolitan Gas Company at Greenwich, caused the complete wrecking of the company's No. 2 gas holder and other holders to be badly damaged; the shock experienced at the works was terrific. The No. 2 gas holder was built in 1891 and had a working capacity of 12 million cu. ft. The explosion occurred at about 6.52 p. m., on Friday, January 19, 1917. Large numbers of slates were torn from the roofs, windows in all directions were broken, and the works generally severely shaken. The following is a first-hand description of the effect the explosion had upon the works and upon those present at the time:

"At the offices of the works, which are close to the river side, and some 700 yards away from No. 2 gas holder—the report was terrific—the floor appeared to heave, the building rocked. This was followed by a blinding glare, seen through the venetian blinds, and lasting a very few seconds, during which it seemed to be as light as day outside. Then the glare ceased, and the north-eastern sky was suffused with the glow of a tremendous fire. The source of the shock and the report was at once apparent. Those in charge immediately rushed to see whether damage had been done to the carbonizing plant — more especially on the vacuum side of the exhausters.

(*Continued on page 558.*)



WHAT WAS LEFT OF THE 12,000,000 HOLDER AT GREENWICH

# American Gas Engineering Journal

SIXTIETH YEAR

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## As the Journal Views It

### The Hundred and Eleventh Volume

With this issue the AMERICAN GAS ENGINEERING JOURNAL completes its hundred and tenth volume and its sixtieth year of existence.

Begun in a period of uncertainty after the Armistice the editorial contents of the volume now finishing reflects to a large degree the gas field's gradual settling to a normal degree of confidence in the future and the shedding of its fears as to launching anything an uncertain future might influence either towards success or failure.

Few could be found last January who would hazard a prophecy as to what that future might represent. Few had the temerity to advise any line of action. All seemed to be waiting—for what they did not know.

Surrounding conditions have not altered. They are pretty much now what they were then. But the atmosphere in the gas industry is different.

Where there was inaction—hesitancy—we now see definite programs either forming or being carried out. There is a spirit of aggressiveness in the air. People are giving voice to opinions not in timerous whispers, but in firm tones and with confidence. We are getting back to normal, if not in conditions, at least in our mental perspective.

The Hundred and Tenth Volume began as a disappointment. Various numbers went out to our subscribers that did not in our opinion carry the confidence and

the helpfulness we would have liked them to carry.

Practically the whole task of "finding" the editorial contents fell back upon the JOURNAL's editorial staff. Normally a goodly proportion of them are sent in by the working gas man.

But as the weeks moved by the people of the gas field seemed to be getting their bearings back, to realize after all that the world is round, that it moves, that the air we breathe is practically the same air as we always have breathed—that in short, things are pretty much the same as they always have been, the only differences being for the better. If there was reason for hope and optimism four years ago, there is even more reason for hope and optimism to-day.

It became possible shortly to make of the editorial contents approximately what in our opinion they should be—that means the bulk of material being from the pens of the men who are actually doing the work that marks the progress of the gas field. The ability to do this has become especially pronounced as the volume closes.

There is ample reason to believe that the AMERICAN GAS ENGINEERING JOURNAL in its Hundred and Eleventh volume can resume progress in getting more intimately in touch with the actual needs of its readers in the way of information and can circulate amongst them the kind of help that the man who has wrestled with a particular problem can supply the man who is just now facing it.

To do so successfully it must have the co-operation of its readers, but unless the history of the past counts for nothing this can be taken as assurred.

## Nominations for American Gas Association

The Nominating Committee of the American Gas Association, we believe, has made a wise selection in its nominations for next year's officers.

Renominating George B. Cortelyou as president is an essentially logical step, though we agree with the committee that succession to offices should not be established as a precedent in the association.

Our viewpoint in this matter is based on consideration to the officer rather than consideration of the interests of the association.

Being president of the American Gas Association should not be merely an empty title. With the present incumbent it has not been.

Mr. Cortelyou has made it a real task, and, in so doing, since it had of necessity to be a task additional to his duties as president of the country's biggest gas company, it must be an arduous task and one that, his sense of responsibility satisfied, he would gladly relinquish.

But there was delay in selecting a secretary-manager. This delay was justified in the importance of the office and in the excellence of the selection eventually made.

When that secretary-manager has thoroughly gotten his bearing, changes in the presidency will not be of considerable import. Under existing circumstances it would be almost akin to an imposition to add to the difficulties of a secretary-manager but a few months in office a new president, however able, who would also have first to familiarize himself with the job and the Association's needs and possibilities.

With Mr. Cortelyou still at hand and the ability to pick up readily at the point he left off, rather than the need of first going back to study up what is now history, the secretary-manager's task is to a degree facilitated. Progress under these circumstances can be continuous. There need be no interruption.

We do not look upon Mr. Cortelyou's renomination nor would we look upon his re-election as a recognition or reward for what he has done. This would be akin to the kind of reward represented in a lady's clouting Sir Walter Raleigh over the head with her parasol as he stooped to pick up her handkerchief.

We look upon it rather a case of necessitv wherein the gas industry, contrary to its own sense of justice is compelled to ask a member who has already made considerable sacrifices in its behalf and who might ! justified in feeling he has already done enough, to do still more.

One term as president of the American Gas Association is about as much as the industry has a right to ask of anyone of its members.

When it is wholly organized and running in full swing, it is therefore all that it should ask any member to undertake.

## Should We Charge for Service?

C. A. Nash, in a paper printed elsewhere in this issue, advocates charging the consumer for service.

As conditions now exist, Mr. Nash's arguments cannot be but to a degree convincing.

The AMERICAN GAS ENGINEERING JOURNAL, however, does not believe the best good to the gas industry can come from discontinuing free service, but rather from amplifying it.

Mr. Nash speaks truly when he asserts gas companies in general can no longer afford to give service free.

This is a fact. Gas rates as they stand do not in many cases even meet the costs of straight manufacture and distribution. New rates that may be set should include a liberal allowance for service.

He speaks with equal pointedness when he states that many who pay for gas are paying for something they never get, because they never call for it, when they pay for service.

This is due to the fact that a goodly proportion of gas consumers do not even know there is such a thing. When they have trouble on their hands they either seek to remedy it themselves or call in a plumber.

This merely represents a failure on the part of gas companies to educate their public as to what they offer.

It is one more of those cases that explain why an industry that is as close to actual philanthropy in its attitude towards its buyers as any industry we can think of, is most frequently assailed as greedy and hard. It's good, all right, wholesome and, as near as an industry can be, open hearted. But the only part of the body social apparently that is aware of the fact is practically confined to its own organizations or affiliations.

The AMERICAN GAS ENGINEERING JOURNAL would have it assured that every gas consumer had a part of the service he is paying for by having the rendering of it at the inception of the gas company rather than at the call of the consumer.

It would have service carried to him at regular intervals by the canvass or house-to-house method.

To abolish service that is paid for in the lump in favor of service that is paid for by item would be in the nature of a mistake. It would be throwing too much responsibility and choice back upon the consumer.

The gas company cannot afford to have defective or badly-adjusted appliances on its lines, even if the consumer for the sake of saving expense may be willing to tolerate such.

Of course it cannot render service long with the coin coming out of its own pockets. The consumer must pay. But the place to pay is in the rates.

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## Would Charge Consumers for Complaint and Trouble Service

**C. A. Nash of the Opinion that Such Procedure Could Be Made Acceptable and that It Would Minimize Calls on Gas Company**

In the period immediately preceding, and during the forepart of the war, it was the general practice for the gas company to retain a force of men to perform for the consumers various services free of any charge. This condition is rapidly changing and rightly so, declared C. A. Nash, of the Peoples Light Company, of Davenport, in a paper presented before the Iowa District Gas Association convention.

In the early days of the industry it was very common for a gas company to pipe an entire house, and in numerous instances furnish fixtures, lamps and even a stove free of charge, in order to secure the gas consumption. Later on this was found to be undesirable and was discontinued.

Then the policy of charging for this equipment became the rule. This change caused some comment among part of our consumers, who felt that the other policy should be continued. However, we encountered very little real opposition as the big majority realized and agreed that it was necessary to make these charges, and at the present time there is scarcely a situation where the appliances and equipment are not merchandised in some manner or other.

### INDUSTRY HAS REACHED ANOTHER MILESTONE

During the past few years the industry has reached another milestone and it will not be long until charging for service becomes the general practice.

With the pinch of war times the need of some financial relief appeared, but the uncertainty of how long it would continue kept the industry in general from seeking relief through increased rates The companies felt they should bear their share of the burden and did so as long as they could. Later on, however, it became necessary that expenses be reduced to the minimum, for even those securing advances in their rates did not find themselves any too well off.

This brought up the plan of charging the consumer for work on his premises, formerly done free. In very rare instances does this revenue cover the cost of maintaining the service department, but it materially reduces the amount that must be borne by the other departments. The gas companies are surely entitled to this revenue for their whole existence is in "selling service." The consumer does not see what he buys, but pays for the service rendered, not for several thousand cubic feet of gas, but for the cooking and lighting this gas enables him to do. He also should pay for the upkeep. Whoever heard of anyone calling on an oil company to come and repair their auto free, because they purchased their gasoline there?

### MOST CONSUMERS WILLING TO PAY A REASONABLE CHARGE

Most of the consumers are willing to pay a reasonable charge and think the company is justified in asking it. The others should be asked to do the same thing. These charges, however, arrived at, should in most cases, be collected on the premises. In fact, excepting for the instances where the trouble affects the gas supply, the C. O. D. should be insisted upon. It costs considerable to handle this number of accounts on the books and if collection is not made at the time, it is generally slow, as the amount involved is so small. This will almost, if not entirely, offset the benefits derived from the entire scheme.

The installing of the system requires a large amount of close observation to iron out the kinks, smooth over the objections and see that everyone is being treated the same, and fairly. If this is not carefully done, one is apt to find themselves in quite a mix-up. The customer is paying increased amounts for everything he buys and has been taught for years to expect the service we are now charging him for gratis. He feels that he is being imposed upon, but if it is carefully explained, there are few who will not coincide with our views and pay cheerfully.

### POSSIBLE PITFALLS

There are a few pitfalls that will spoil all the beneficial results if not avoided. If the charges are too high or the installing of the system is not carefully and conscientiously done, the consumers are not going to call for attention. This will result in two conditions.

One, that the appliances in use will not receive the care they had in the past and after a period of time, we will find that a large part of them are in poor condition. This will either cause us to repair them all at once and necessitate a temporarily large force of men, some of whom do not know anything about gas appliances or how to handle the consumer. Or have a number of our

customers receiving poor service from their appliances, hence they will be dissatisfied and they will hold the company to blame for their condition.

The other is that the calls will be insufficient in number to keep a full force employed in the shop and should a sudden cold day or other emergency appear, the shop will be sadly crippled and be unable to care for the calls. Further, when the busier periods arrive, we will have but few men who know gas appliances, or anything, in fact, about that end of our business.

### Essential That Consumer be Given a High Grade Job

The better way is to have the calls coming in as previously and having the customers satisfied and willing to pay for the charges. However, when we charge a customer for a service which he has always had free, it is absolutely essential that he secure a high grade, thorough job, so that he will feel he has received his money's worth.

The benefits derived from this system are several and contain many desirable features. 1—The calls received for adjustments, regulation and cleaning are going to be bona fide calls where the condition warrants our attention. 2—Ordinary adjustments and cleaning applying more to the top burners of the range, are going to be done by the consumer, and rightly so. 3—The calls for imaginary troubles will cease after the first call where a charge is based. 4—Undesirable conditions existing in piping, etc., will be corrected after a few charges. 5—The cost of maintaining a suitable shop will not be such a burden to carry. In addition to these, by effecting collection at the time the work is done, it will teach the customer not to ask for help unless needed and keep the many small accounts off of the books. It further has a psychological effect to the end that the consumer does not feel that the company is getting so much for the gas it can afford to do all this work free.

Services charges are fully justified by any fair-minded person, if they are carefully explained. The gas companies are "selling service" exclusively and should "sell their product" not give it away. If I were to come into your office with a nice nickel-plated telephone and ask that I may be permitted to install it there, giving a connection to every building in the city, you will ask, how much? and I'll tell you "nothing" this is entirely free; *but*, should you wish a connection at any time, you could not expect me to maintain an exchange free and that you must go up to the exchange building and plug it in yourself." You would undoubtedly tell me to take the phone away, that you don't want it around. But you will still retain the one you have and pay for it. You pay for "service" and that only.

To sum up: Is it desirable to charge consumers for complaint and trouble services which formerly were done free? If so; to what extent should this policy be employed? Should we charge for leaks, freeze ups, adjustment, regulation or cleaning of appliances? In fact for all of our service calls, or should we charge for only part of these, and if so what part? Our customers pay for services and should pay for all they get, if only out of justification to those who, while paying the same amount for the gas, rarely, if ever call for attention.

## Eight Million Cu. Ft. of Manufactured Gas Burned in a Few Seconds, Lighting Up All London

*(Continued from page 554.)*

The boiler attendants and engine drivers, however, said that all was well with their plant; but somebody said, 'No. 2 gasholder has gone up.' It was evident, however, that a supply of gas was being maintained, for though some lights had been blown out, many were still burning."

The damage sustained by buildings was found to be practically confined to windows and doors. The windows of the offices, engine rooms, and shops were extensively smashed, window frames were dislodged, and one or two heavy doors blown off their hinges. The floor of the engineer's office was thickly strewn with small pieces of plate glass from end to end of a long narrow room, and a 4½ in. partition between it and the stores had been severely shaken. The roofs of buildings, apart from the stripping of slates, which was not extensive, escaped uninjured, also the retort house shafts. No. 7 coal store, however, the nearest to the coal field, sustained some damage. Here the roof principals are carried on columns placed about 30 ft. apart on the coal store wall, and the spaces between them are filled in with corrugated sheeting, having a timber stiffener 6 in. by 4 in. by 16 in. in the middle of each bay. Eleven of these, of a total of fourteen, were broken.

The No. 2 gas holder at the time contained 8,000,000 cu. ft., and at the moment of the shock, was probably in the very best position to resist any unusual or special strain, such as a gale of wind or drifting snow, provision for which had been foreseen and duly provided against. The holder, however, had not been built to stand up against the shock of an explosion of a large quantity of TNT occurring at a distance of 1½ miles as the crow flies.

It would appear to be clear that the holder was wrecked either by the pressure produced in the atmosphere by the explosion or by the vacuum immediately succeeding it. That a tremendous shock resulted from the explosion is shown by the fact that windows and doors were blown outwards or inwards many miles from the scene of the explosion; and at the Old Kent Road works, which is four miles distant as the crow flies, a holder of a capacity of 5½ million cu. ft. was seen to rise and fall from 1 ft. to 3 ft., according to eyewitnesses. The extent of this disturbance is borne out by the chart registering the district pressure, which oscillated between 46 tenths and 55 tenths, settling down to its normal pressure of 50 tenths in the space of from five to eight minutes, so far as can be ascertained by the state of the chart. It may be mentioned that the blinding glare which was observed throughout the whole of London at 6.52 p. m., on that January evening, the lightness of which has been compared to the brightness of a summer's day, was undoubtedly due to the burning in a few seconds of 8,000,000 cu. ft. of gas contained in this holder. The extent of the damage and the work involved in repair may be better pictured from the fact that although the explosion occurred nearly 2½ years ago, the holder is even yet not ready for use.

In this instance what might have been an ugly state of affairs was avoided by the presence of mind of the valveman on duty at the time, who, although he was directly beneath a burning stream of 8,000,000 cu. ft. of gas, did the right thing at the right moment, for which

he was subsequently awarded the medal of the Order of the British Empire.

Mr. Townsend closed his address with pointing out that the foregoing particulars prove conclusively how safe gas works really are. He said numerous gas holders have been destroyed by enemy shells, by bombs from hostile aircraft, and by explosions at adjacent munition works; but in every case the gas contained in them either escaped harmlessly into the air or quietly burned itself out. In the case of the Silvertown disaster, no less than 8,000,000 cu. ft. were fired, and London lit up by the blaze; but there was no explosion or damage done except to the gas holder itself. This should surely remove the long-existing prejudice of the public and show them how groundless their apprehensions are.

Another lesson to be learned from the foregoing narrative was the utter futility of the idea, so prevalent among the military authorities and chief constables of the country, that gas could be shut off altogether at the gas works; for it is on record that people were still burning the gas stored in the mains in the high parts of Hartlepool sixty hours after all the gas holders had been destroyed by enemy shells and the gas burned which they contained. Ample evidence is afforded of the correctness of the gas managers' view, so universally held, that the safest plan was to keep the mains charged with gas at the lowest pressure necessary for that purpose; and the fact that in not a single instance where gas mains so charged were destroyed by shells or bombs did any explosion occur or was damage done to surrounding property, this should reassure the public mind, and prove that the distributing mains in the district are as safe as the gas holders at the works.

Perhaps the most remarkable fact of all is that London, which was the principal object of attack, and which "enjoyed" no less than sixty-three visits from Zeppelins and aeroplanes, sustained only what can be called trifling damage so far as its gas works were concerned. This is all the more remarkable when it is remembered that gas works in London are comparatively thickly scattered, there being no less than eighteen in the inner metropolitan area alone. London, in fact, has chiefly a tale of broken mains, both large and small, and anxious waits for the breakdown gangs stationed at various depots with motors fitted with all manner of necessities.

Though in all these instances the damage to works and plant was considerable, there will always remain the consolation that the loss of life was exceptionally small in comparison with the damage, and there can be nothing but pride for those who wrestled with the battered plant for many hours at a stretch in order to maintain the supply of gas. In the case of Hartlepool, efforts almost superhuman must have been demanded, and it will stand to the lasting credit of the staff of this undertaking that, with practically all the gas holders put out of action and the whole place littered with debris, they managed to re-establish the supply less than sixty hours after the bombardment occurred.

It is well that Mr. Townsend has so admirably put on record for all time the trial and responsibilities of the gas works staff as a whole during this dismal period, for our memories for such things are short-lived, and those officials whose activities lie in more remote parts will at least be able to feel grateful that they were preserved from one of the most harassing features of the war.

## A. J. Deischer Reports "Criminal Waste" of Gas in State of Texas

A report of the committee of the American Natural Gas Association signed by A. J. Deischer, chairman of the committee, a natural gas man of wide experience and great ability, in the recent convention at Cleveland on conservation of natural gas has the following on the Texas situation:

"In the State of Texas perhaps the most criminal waste going on in the country to-day is occurring. These wells should have rock pressure in excess of 1,000 lb., and it is estimated by men fully conversant with the situation and well qualified to pass judgment upon the extent of the wastage that fully 2,000,000,000 cu. ft. are being blown to the air daily in central Texas districts. The sad part is that this is the beginning of the development in that territory, and unless, owing to the great cost of drilling with standard tools, rotary drilling is applied, we can look for as shameful a waste as occurred in the Cushing field and elsewhere in the early days of the gas development in the United States."

Other features of the natural gas situation were reported on in part as follows:

"In the older States where natural gas has been produced for many years, and where the rock pressure has declined and both the natural gas men and the consumers have felt the hardships of shortage of supply, the greatest accomplishment of effective conservation is had. In the older States where the two stage compressors are installed, and a tendency inaugurated to gather and market the gas from the casing-head plants, least waste has taken place. This embodies the Appalachian fields generally. In the mid-continent district, where pressure has not declined to such great degree, and where large gas wells are still brought in and new fields being discovered, effective conservation has been accomplished in most of the States through legislation in ample time to save much of the natural gas for the benefit of the people, although it is a question whether 50 per cent of the gas originally in these fields will ever be available, due to great losses of the past. Oklahoma's conservation law has been very effective, very practical and well enforced, being supported financially by the State, and having an active and efficient organization under the direction of the Corporation Commission. Louisiana has under its recent regulations practically embodied the main features of the Oklahoma law, but Louisiana unfortunately is not so well regulated as Oklahoma, due to the apparent lack of financial support and proper organization in the field to inspect wells and require proper precautions to be taken in ample time to prevent the large wells at high pressure breaking loose and blowing beyond control at the time of drilling them in. They require permission to be granted by the State authorities before a well can be drilled, deepened or plugged, and if they could secure ample organization in the field to follow up their supervision this State would have very effective conservation.

"In the State of Kansas there is not much gas being wasted at the wells by blowing. They have felt the inconvenience of gas shortage, and the operators appear to have a higher regard and co-operate toward conservation. Although these fields are very closely drilled, and must decline rapidly, no great wastage is occurring."

## Find the Means to Sell Water Heaters in a City Where Great Volume of Hot Water Is Included in the Rent

New York City has never been as fruitful a field for gas water heater sales in proportion to its population as have other territories of lesser size and degree of congestion. For New York is pretty much a city of apartment dwellers and is becoming more so.

The almost general rule is for the landlord not only to supply space, but heat and hot and cold water as well.

Yet the Consolidated Gas Company of New York has never ceased plugging on the water heater end. This summer it even went in for advertising water heaters in a considerable scale. The copy shown in the accompanying illustrations was run extensively in the daily newspapers from June 5 to 19.

The advertisements were exceedingly productive in results. There was a far larger sale of gas water heaters in June, 1919, than for the same month in any previous year.

**Special Sale**

OF ALL TYPES OF

**Gas Water Heaters**

WITH A

**10% Discount on All Purchases**

BEGINNING NEXT MONDAY AND CONTINUING DURING THAT WEEK, WE WILL OFFER THIS WONDERFUL INDUCEMENT TO THOSE DETERMINED TO HAVE AN EVER-READY AND UNFAILING SUPPLY OF HOT WATER. WHETHER YOU BUY FOR CASH OR ON OUR INSTALMENT PLAN, THE 10 PER CENT. DISCOUNT WILL BE ALLOWED.

Many Landlords and Tenants are sorely tried at this season of the year on account of the shortage of the supply of hot water. A Gas Water Heater makes such complaints impossible. We have Gas Water Heaters for use in

**Homes, Factories, Laundries, Hotels, Stores Restaurants, or by Druggists and Confectioners**

In other words, there's a Gas Water Heater that will provide hot water wherever hot water is needed, and that is—*everywhere.*

WILL BE ON DISPLAY IN THESE GAS OFFICES

No. 157 Hester Street
No. 130 East 15th Street
No. 142 East 15th Street
Nos. 212-218 West 57th Street
No. 1909 Amsterdam Avenue
No. 32 West 125th Street
No. 20 Webster Avenue, Long Island City
No. 2084 Third Avenue
No. 529 Courtlandt Avenue
No. 1815 Webster Avenue

**Consolidated Gas Company of New York**

GEO. B. CORTELYOU, President

## Gas Sales Association of New England Annual Meeting

The annual meeting of the Gas Sales Association of New England was held on May 9 at the Boston City Club. William Gould, governor, spoke at length of the extremely trying period through which the organization had passed, and commented favorably on the survival of interest as compared with the disheartened functioning of many other older and more firmly established gas industry organizations.

"Co-operation between manufacturer and gas company men is absolutely essential," said Mr. Gould. "This has been the idea back of this association from the start. Such co-operation must be on a fifty-fifty basis. No appliance man should expect 100 per cent of the co-operation to come from the gas company man, and the gas company man who expects 100 per cent of the co-operation to come from the appliance man is sadly in need of disillusionment."

The governor suggested a new plan of operation which the board of directors had considered favorably. The plan is as follows: Whereas in the past the annual dues have been $10 per year and members have paid $1.50 each for each dinner they attended, it is now suggested that the dues remain as before, $10 a year,

and that the expense of dinners at six regular meetings be borne by the treasury. The object of this is to penalize members for non-attendance. Their dinners will be paid for and it is their loss if they are not there to eat them. This plan has been tried successfully in a number of similar organizations and has tended to increase materially the percentage of attendance. Guests' dinners will be charged at the regular rate. The members bringing guests will pay for their guests' meals.

After discussions by H. A. Norton, H. J. Pettingill, A. A. Higgins, W. T. Pease, Fred L. Carter and J. H. McPherson, Mr. Pettingill moved that the plan be adopted and put into execution beginning with the first meeting of the season 1919-1920. The motion was seconded and adopted by unanimous vote.

W. T. Pease, the treasurer, then submitted the following annual report:

| | | |
|---|---|---|
| Balance carried forward from 1917-1918 | | $70.47 |
| Received dues from thirty-eight members—$10 each | | 380.00 |
| Received cash for one dinner | | 1.53 |
| Received cash from W. T. Pease for bill of 1/25/18—Ck. No. 36, paid twice | | 5.95 |
| | | $457.95 |
| **EXPENSES** | | |
| Reprinting minutes | $38.03 | |
| Postage | 27.54 | |
| Cigars and cigarettes | 58.96 | |
| Steamer King Phillip | 23.50 | |
| Extra dinners | 39.91 | |
| Express on association filing cabinet | 1.05 | |
| Printing and stationery | 39.25 | |
| Speaker W. R. Balch | 30.00 | |
| Remembrance for Lieutenant McKeane | 30.00 | |
| Gratuity to employees' city club | 25.00 | |
| | | 313.24 |
| Balance on hand | | $144.71 |

F. A. Woodhead, chairman of the auditing committee, reported that his committee had examined the treasurer's reports and found an approved and receipted bill for each and every disbursement and a full accounting of all moneys received. The bank balance reported by the International Trust Company to the association's credit agreed with the balance shown on the treasurer's books.

On motion of F. L. Carter, the reports of W. T. Pease, treasurer, and of the auditing committee were accepted and placed on file. The motion was seconded and carried by unanimous vote.

The nominating committee, H. A. Norton, chairman, submitted the following majority report:

"Your committee appointed to nominate officers for the ensuing year makes the following report:

"In the past two years, during the war period, there has been little or no activity in gas associations, and benefits to be derived from such an organization by its members have been in proportion less than formerly. The war is over, we hope, and we are now going through a reconstruction period. Those of you who attended the special meeting of the American Gas Association in New York in March must have been impressed with the changed condition of affairs in the country, and particularly in our business, and the great need for teamwork and to carry on our work.

"It must have been gratifying to the manufacturers of appliances, those in charge of the selling of these appliances, and the new-business men of the gas companies to note the welcome extended to us by the other sections of the association. No organization, no matter how strong their officers may be, can succeed and produce results without teamwork and loyalty. Each branch of our business requires the co-operation of every other department. That rule applies to this association as well as to any corporation. From our viewpoint we believe that this association was started on the right lines, and that there was need of an association of this kind in New England. This opinion is probably not held by all of the managers of the New England gas companies, but we believe that the majority of them approve of the work that this association is trying to do. It is therefore the duty of every member to impress upon the gas managers of New England what this organization stands for and what good work it is doing in increasing the sales of gas. Under these conditions your committee is strongly of the opinion that there is a future for this organization. We get what we give in this world, and what we get for nothing amounts to mighty little.

"The above remarks may be out of place, for a large majority of the members have loyally supported this association. The committee found that your board of governors were anxious to be relieved of their duties and to have a new board take up the work for the coming year. It was the opinion of the majority of the nominating committee, considering the crisis that we went through the past two years and the reconstruction period just ahead of us, that we should re-enlist your present board to carry on for one year more. The world war has demonstrated that it does not take long to cause destruction, while we as engineers know that it takes some little time to properly construct. This association has the groundwork of a good construction organization, and to carry to completion this work we ask the support of every member for the following gentlemen whom your committee has nominated as governors of this association for the ensuing year:

"William Gould, governor; J. B. Anderson, M. E. Abbott, R. Buckminster, W. T. Pease, William H. West and F. A. Woodhead, board of managers."

H. J. Pettingill, Jr., moved that the report be accepted. The motion was seconded and carried.

R. Y. Conklin moved that nominations be declared closed and that the secretary be instructed to cast one ballot for the governor and board of managers nominated by the majority report of the nominating committee. Mr. Carter seconded the motion, which was carried by unanimous vote. The secretary pro tem then cast one ballot as directed and declared William Gould re-elected governor and the following board of managers elected for another term: J. B. Anderson, M. E. Abbott, R. Buckminster, W. T. Pease, William H. West and F. A. Woodhead.

William Gould, the re-elected governor, made a strong appeal for more actual co-operation on the part of the members of the association. He called for a promise by a show of hands that each man present would secure at least one new member during the coming season.

"I appreciate," he said, "the honor

(*Continued on page* 565.)

# NEWS OF THE GAS INDUSTRY

## Nominating Committee of American Gas Association Announces Its Recommendations for Officers and Directors

Oscar H. Fogg, secretary-manager of the American Gas Association, announces the nominations, recommended by the nominating committee for officers and directors of the association for the ensuing year: President George B. Cortelyou; vice-president, Rufus C. Dawes; treasurer, William H. Barthold. For directors to serve two years: J. B. Klumpp, A. B. Macbeth, Dana D. Barnum, H. A. Norton, C. L. Holman, Arthur Hewitt, R. B. Brown, and Howard Bruce.

## President of Indiana Board of Public Utilities Acclaims Gas Lights for City Streets

George Lemaux, president of the Indianapolis Board of Public Works, has just come to the defense of gas lights in city streets. A delegation of citizens who lived in Morton Place in Indianapolis, called on the board to change an order for gas lights to electric lights, following a mass meeting of citizens, which adopted resolutions against the gas lights to send to officials of the city administration. Speakers at the mass meeting had objected to the installation of gas lights on the ground that the iron posts, necessary for the lights, made the streets unsightly. In a statement, which became public in Indiana, Mr. Lemaux declared that the board of safety had approved gas lights for Morton Place because they meant a considerable saving to the city, over other types of street lighting and also "because of their greater efficiency in throwing a light in spots, which are heavily shaded." The arc light in heavily shaded parts of the streets only throws a light a short distance along the square, leaving much of the shaded area in almost total darkness, Mr. Lemaux contended.

WILLIAM T. RASCH

## Akron, Ohio, Returns to Artificial Gas

### Old Plant Put in Operation

The artificial gas plant belonging to East Ohio Gas Company is being repaired and in a few months will be in shape to supply gas. Workmen are already laying pipes and in the near future gas fixtures will be installed in the homes. Eventually artificial gas might be supplied to the smaller surrounding towns, but for the present arrangements were not being made for distribution outside of Akron. The price of the gas for domestic consumers will be $1.05 per 1,000 ft. $1 per 1,000 net, with a service charge of 50 cents per month.

The plant has not been operated for the past ten or twelve years. At that time the large quantities of natural gas made the plant useless. The diminishing supply of natural gas, however, has made it necessary to get the old plant back into shape to produce gas.

## William T. Rasch Appointed Engineer of Utilization of New York Consolidated

At a meeting of the executive committee of the Consolidated Gas Company of New York, on June 17, 1919, William T. Rasch was appointed engineer of utilization. Mr. Rasch is 32 years old; he entered the service of the Consolidated Gas Company in 1906, in the department of mains and services. In 1908 he became assistant to the engineer of that department ,and later, as field engineer, supervised the laying of several large gas mains. Completing this work he was selected to make special investigations for the company in new processes of manufacture and the calculations of reproduction values. In 1913 he became assistant engineer of utilization, and when Colonel Oscar H. Fogg, then engineer of utilization and recently appointed secretary-manager of the American Gas Association, entered the military service in 1917, Mr. Rasch was placed in full charge of the department.

## Sale of Southern Illinois Light & Power Expected

A semi-official report comes from Chicago that negotiations are in progress for the sale of the Southern Illinois Light & Power Company, to a concern thought to be the North American Holding Company. The latter company is identified with the Studebaker corporation. The Southern Illinois Light & Power Company includes the Frey interests, which have long been prominently identified with public utilities in the Chicago district. The transaction will involve hundreds of thousands of dollars, and is expected to be consummated before the first of July.

THE SPRINGFIELD (MASS.) GAS LIGHT COMPANY has bought a large tract of land, with buildings, in East Springfield. The papers were passed in the registry of deeds.

## Fairmont, Minn., Asks Bids on Gas Plant

Fairmont, Minn., can install a gas plant at a cost less than $100,000 and sell gas at around $1.75 a 1,000, according to D. C. Tenney, vice-president of the American Gas Construction Company, Newton, Iowa, who inspected the city for two days. This figure is lower than expected as Supt. Horne had predicted that a plant might cost $125,000. It was recalled that when it was sought to put in a gas works four years ago the cost was estimated at $85,000. Mr. Tenney's company has built a score of plants in the Northwest. He stated that Fairmont would need about nine miles of mains to reach her consumers. The construction expert took home plats of the city and will submit detailed figures at a later date.

## Ohio Cities Gas Goes into the Salt Business

Ohio Cities Gas Company has completed and placed in operation a modern salt plant on the Kanawha & Michigan division of the New York Central lines, outside Charleston, W. Va. The present capacity of the plant is 1,000 barrels of common salt, 25 tons of calcium chloride, and 500 pounds of bromine, daily. The market price for these products is: $1.60 a barrel for salt, 65 cents a pound for bromine, and $16 a ton for calcium chloride. The plant is on a tract of twenty-two acres owned by the company, which is believed to contain an inexhaustible supply of brine, running about 50 per cent water and 50 per cent salt. The wells are drilled, the same as for oil, to a depth of about 900 ft., where the brine is encountered and forced to the surface by the introduction of air.

In connection with the plant a barrel factory, capable of turning out 1,000 finished barrels daily, has been erected with the most modern of automatic machinery. In addition the company makes its own drums for packing calcium chloride and but sixty men are needed to operate the plant. The chief market for the company's salt, used mainly for stock purposes, pickling, packing and curing meats, are the Southeastern and Southern States where a big demand prevails. An added factor is the location of the plant which has an advantage of about four cents per hundred-weight in freight rates over its nearest competitor, located at Pomeroy, Ohio.

## Standard Gas Takes on Additional 80,000 Acres Oil Leases

H. M. Byllesby, president of the Standard Gas & Electric Company, has just announced the addition of 80,000 acres of Texas oil leases for the Shaffer Oil & Refining Company. These leases, which have been under negotiations for some time, are in fields where recent wells have developed large production. Active drilling preparations, Mr. Byllesby says, are now in progress. Mr. Shaffer and his associates have had a force of field experts in Texas for months, but until now have not been in a position to disclose the fact that they intend to operate extensively in Texas. The Shaffer company already had 10,000 acres of oil leases in Texas, so the 90,000 acres now held by the merged companies constitutes a considerable field of operation. The new acquisition constitutes merely one of a series of expansion activities which the company expect to carry on, in addition to the large producing and refining activities which have been carried on by the Shaffer Company in Oklahoma and Kansas for many years.

## North Dakota Commission Orders $2.25 Rate in City of Bismarck

The State Railroad Commission of North Dakota has issued an order by which the Bismarck Gas Company, of which F. E. Ployhar is president, is permitted to increase its charge for gas by 50 cents a thousand over the present rate, which has heretofore been limited by a franchise. The new rate, held by the commission to be inadequate to meet financial requirements of the company, will be net $2.25 a thousand for consumers of less than 10,000 ft., the rate graduating as consumption increases. The company asked the $2.25 rate, which was held by it to be the largest rate that could be charged and still retain business. The commission says the new rate will not give the company sufficient revenue to operate at a profit.

THE BOSTON CONSOLIDATED GAS COMPANY reports its output for the month of May was 492,375,000 cu. ft., a decrease of 6 per cent compared with the corresponding month a year ago.

## Brownwood, Texas, Will Change from Artificial to Natural Gas

The Texas Power & Light Company has asked the city council of Brownwood, Tex., for a franchise permitting the company to distribute natural gas to Brownwood domestic and industrial consumers, amending the franchise under which the company is now distributing manufactured gas. The rates asked in the franchise are left to the direction of the city council, provided they offer a "reasonable and fair return upon the investment" of the company.

## President Samuel Insull Gives Important Testimony for the Peoples Company

### Discusses Company's Affairs and Operation from Every Angle

The long grilling of the Peoples Gas Light & Coke Company of Chicago at the hands of the State Public Utilities Commission turned in the other direction this week with the appearance before the commission of Samuel Insull, chairman of the board of directors. In a detailed and direct analysis of the company's situation, he stated that either the present rates must be raised, or the company go into the hands of a receiver within a year. Declaring it to be his belief as the result of long experience with public utilities that gas and electric companies should control the coal, fuel and oil they use, Mr. Insull described the plans now under way by the company for the construction of a new coal gas plant, calculated to produce cheap gas for the city.

"There is only one solution of the whole gas problem," said Mr. Insull. "The question will be answered only with the building up of plants where coal gas can be made instead of water gas. That would take between $12,000,000 and $15,000,000. It would be impossible to raise that amount if the rates are reduced—in fact, it can't be done at all unless the rates are increased.

Mr. Insull stated that plans for the new plant are being drawn, that $1,818,933 had already been spent in the preliminary work of construction, and that $1,540,000 more were contracted for. In answers to questions by Timothy F. Mullen, chief counsel for the gas company, he stated that the company should have a working

capital of "at least $9,000,000." Taxes for 1919, he declared, would be $300,000 in excess of the $857,000 of the year previous, and a contingent reserve fund of $274,120, estimated by the company as necessary, was according to his judgment, entirely inadequate.

In regard to the toluol plant which the company built last year at a cost of between $850,000 and $900,000, Mr. Insull declared that it had proved a good investment, and had made a large profit. "If we had waited for the government to finance it," he said, "we would not have made that profit, which helped to enable us to cut down the price of gas. Also we wanted to build the plant ourselves for patriotic reasons."

In direct examination by attorneys for the gas company he told how, on March 20, the company had cancelled a contract for coke at $9.50 a ton with the F. G. Hartwell Coal Company, and had entered into another with the Peabody Coal Company under which it paid $6 a ton.

Despite the apparent increase of $3.50 a ton, Mr. Insull declared that because of the higher quality of gas-producing material furnished under the second contract, and because it insured regular deliveries of larger quantities, it was estimated by company engineers that by March, 1920, a saving of $300,000 would have been effected.

"It was cheaper to buy expensive coke and get larger quantities than to depend on the small, irregular deliveries under the old arrangement," he declared. "In fact, the lower priced contract showed a book loss of $55,000 when cancelled."

Mr. Insull described the circumstances which led the company to organize the Manufacturers' Coal & Coke Company to insure the supply of coke during the winter season. He declared that if the gas company had undertaken to get control of producing corporations before that time, it would not have been financially embarrassed. His statement on this point was voluntary.

"Taking up the contracts with the Manufacturers' company, is the Peoples Gas Light & Coke Company in control of its stock?" asked Attorney Mullen.

"It is," replied Chairman Insull. "I might state here that I believe gas and electric companies should control the production of the oil, coal and fuel they use. That is the policy I have carried out in most of the utilities I am connected with.

"But for the control of this production, the Commonwealth-Edison Company would be in the same deplorable condition now as the Peoples company. I am glad to state this, because for years this policy was criticized by the city council, which had, or thought it had, the power to regulate our affairs.

"I don't believe the gas company will be able to function satisfactorily until it owns the source of production. We had a great deal of trouble getting fuel during the winter of 1917, and expected it during the winter of 1918."

Details of the formation of the Manufacturers' Coal & Coke Company showed that the Peabody Coal Company had carried about half of the financial burden of the operation and in return was hired to operate it on a percentage basis. Eventually, said Mr. Insull, a larger production would be obtained, which would help to create an asset which would eventually accrue to the consumers. The profits of the present operating agreement would be reflected in dividends. The net earnings last year, on the whole production of the mines, amounted to $108,859. The selling price of the coke, said Chairman Insull, was fixed by mutual agreement.

The Manufacturers' company, he declared, was the only coal concern in which the Peoples company had a direct interest. A purchase of about 65,000 tons of coke from the By-Products Coke corporation was made on the advice of engineers to use Solvay coke instead of West Virginia coke, in order to get better gas. Questioning whether the scheme was profitable, a contract was made for only three months' supply.

When asked what would be the financial condition of the company if it went back to the pre-war rates of 70 cents per 1,000 cu. ft., Mr. Insull said:

"If the old rates went into effect in August the Peoples Gas Light & Coke Company would not even be able to meet the interest on its bonds and mortgages. This is without taking into consideration the labor market or the coal and coke market. Labor is going upward, and the coal market, in my opinion, surely will stiffen. Nor have I included needed improvements, and I am told by my engineers construction of a 10,000 ft. holder is necessary to make it safe to operate during the winter."

Here tabulations were introduced by the gas company's attorneys showing a loss of $1,366,628 was sustained by the company in 1918, and $365,201 in 1917. A surplus for the first five months of the present year was given as $158,569.

The public had absorbed $1,573,260 of the company's money during the last two years and five months, said Chairman Insull. He spiritedly defended the officers and employees of the company. Of the 160,000,000 operations necessary to make out the statements monthly only three errors in every 10,000 are reported—a low percentage, he said.

Mr. Insull spoke of the serious situation existing in gas leakage from electrolysis. The electric lines of the Commonwealth Edison Company, and the gas pipes were placed too near the city's water mains, he said, and leakage resulted. When asked by the city's attorney, Donald E. Richberg, if some of the loss was not due to the electrical conduits of the company also under Mr. Insull's control, he answered:

"The situation is grave, but it is not due to the cause stated. The Edison company is suffering nearly as much as the gas company. The inadequate provision for return cables of the surface and elevated lines is the source of the trouble. I served notice on the president of the South Side road that immediate remedy would have to be sought. This will be asked for either in the courts or before this commission."

Mr. Insull had cut his salary of $50,000 in half to save the company expense, he declared. Besides his official position with the Peoples company, in which he holds about 1,500 shares of stock, he is president of the Commonwealth Edison Company, president of the Public Service Company of Northern Illinois, chairman of the board of directors of the Chicago Elevated Railway Company, chairman of the board of directors of the Chicago, North Shore and Milwaukee Railway Company, and executive officer of the Illinois Northern Utilities Company and of the Central Illinois Public Service Company.

## Utica Company to Erect $12,000 Addition

The United Gas & Electric Company has obtained a permit to remodel their building at an estimated cost of $12,000. The company will build an addition to its present building 17 x 51 x 9½ fe. on the west side of the same height as the present building. B. C. Babcock is the general contractor.

(*Continued from page 561.*)
you do me in re-electing me for a third term, and I also appreciate, which many of you do not, the hard work that this honor implies. Many of you members have been content to sit back and 'let George do it.' I speak for myself, and I am sure that I am speaking for those members who have so earnestly assisted me these past years, when I say that we refuse to be 'George' any longer. It is up to every member to do his full share, and I shall take genuine pleasure in seeing that each member does his share and is not allowed to escape his responsibilities. This association has grown and prospered, and is favorably known all over this country among the gas fraternity. It can grow still more and have a still better name if you will all take hold and do your part. You have promised by a show of hands that you will each secure at least one new member this season. That is laudable; but your interest must not stop there. Take part in the discussions; make suggestions; be present at every meeting; bring guests who should be interested in the work we are trying to do, and our organization will flourish as it has never flourished before." (Applause.)

Motion was then made, seconded and carried that the meeting adjourn.

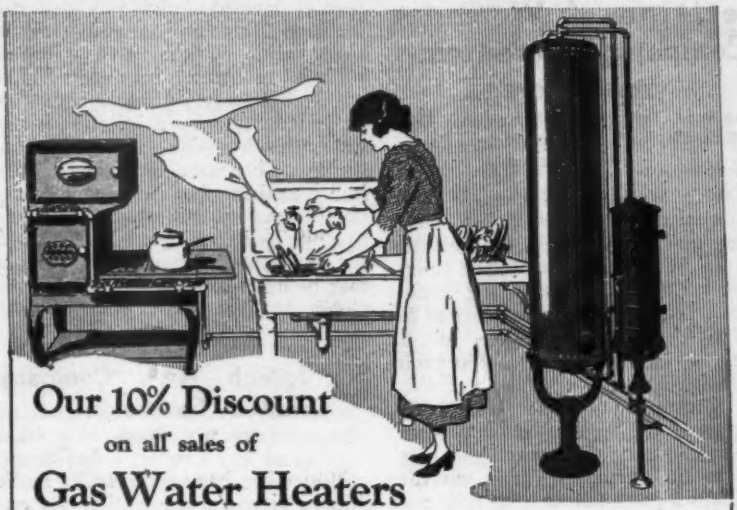
## U. G. I. Gas Sales Increase

According to a statement of the United Gas Improvement Company, sales of gas in Philadelphia for the first five months of 1919 increased more than 5 per cent over the corresponding period in 1918, and it is estimated that sales this year will reach at least 13,000,000,000 cu. ft. Total consumption of gas in the city during 1917 was 12,569,095,086 cu. ft. The directors of the company declared the regular quarterly dividend of 2 per cent, payable July 15 to stock of record June 30.

## Brooklyn Union Subsidiaries Want Permission to Use Trust Fund for Improvements

The Newtown Gas Company, the Jamaica Gas Lighting Company and the Woodhaven Gas Light Company, all of the stock of each of which is owned by the Brooklyn Union Gas Company, filed in the New York County Clerk's office petitions for orders directing the banks, in which they have been depositing money representing the differences between rates charged and the "85 cent gas rate charge" prescribed for them by the Public Service Commisison, to pay them the money pending the final decision by the courts as to the legality of the Commission's order.

In the case of the Newtown Gas Company there is $450,739.46 held in trust by the Bank of Long Island. The $450,739.46 represents 15 per cent of the money paid by the customers of the company since 1916, and deposited in the bank by order of the court pending a determination of the company's contest of the order requiring it to reduce its rates from $1 to 85 cents. The company has been charging the $1 rate and depositing 15 cents with the bank, so that it will be available for distribution among the customers if the courts finally hold that the 85 cent rate is legal. The company in asking for the use of the trust fund points out that it needs to improve its plant and that if it borrowed money from bankers it would have to pay 7½ per cent interest. By using the trust fund it can secure money at the rate of 2¼ per cent, the interest paid by the bank. The company offers to give bonds of the Brooklyn Union and Newtown Gas Companies as security for the use of the fund.



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PROVED TO BE SUCH AN ATTRACTIVE FEATURE TO THOSE WHO WANT HOT WATER, IN ANY QUANTITY, AT ANY TIME—DAY OR NIGHT—THAT WE WILL CONTINUE TO ALLOW THE 10% DISCOUNT ALL NEXT WEEK ON GAS WATER HEATER SALES.

THOUSANDS OF PERSONS VISITED OUR OFFICES AND STUDIED THE OPERATION OF THE THREE TYPES WE ARE DISPLAYING—CIRCULATING, AUTOMATIC INSTANTANEOUS AND AUTOMATIC STORAGE WATER HEATERS. THE SIMPLE METHODS OF PIPE CONNECTIONS WERE EXPLAINED TO OUR VISITORS AND PURCHASERS. GAS WATER HEATERS ARE INSTALLED SPEEDILY AND WITH OUT ANNOYANCE TO YOU.

LET US HAVE YOUR ORDER TO-DAY

IF YOU CANNOT VISIT ONE OF THE GAS OFFICES LISTED BELOW, WE WILL BE PLEASED TO HAVE ONE OF OUR REPRESENTATIVES CALL AT YOUR RESIDENCE OR PLACE OF BUSINESS. GAS WATER HEATERS FOR FACTORIES, LAUNDRIES, HOMES, HOTELS, RESTAURANTS, STORES, OR FOR USE BY DRUGGISTS AND CONFECTIONERS.

SEE THE DISPLAY IN ANY ONE OF THESE GAS OFFICES

No. 157 Hester Street
No. 130 East 15th Street
No. 142 East 15th Street
Nos. 212-218 West 57th Street
No. 1909 Amsterdam Avenue
No. 32 West 125th Street
No. 2084 Third Avenue
No. 529 Courtlandt Avenue
No. 1815 Webster Avenue
No. 20 Webster Avenue, Long Island City

Consolidated Gas Company of New York

GEO. B. CORTELYOU, President

ANOTHER OF THE CONSOLIDATED COMPANY'S ADVERTISEMENTS IN THE HOT WATER HEATER PUBLICITY CAMPAIGN

## Petition of Worcester Company Before Commissioners

**Company Objects to Setting Aside $20,000 to Make Up for Dividends Paid but Not Earned**

The State gas and electric light commissioners of Massachusetts have taken under advisement the petition of the Worcester Gas Light Company for an abatement of the recent decree reducing the price of gas to $1.10 per 1,000 cu. ft. from July 1 after a hearing in the Common Council chamber.

The company objects also to setting aside the sum of $20,000 from the earnings of the current year to add to the surplus to make up for dividends paid but not earned, according to the decree.

The city does not object to the reduction in price and the payment of the $20,000 being deferred until March 1, when the present contracts for fuel oil and other supplies expire, and it is hoped that new contracts will be made at more favorable prices. Francis H. Dewey appeared for the company and submitted figures to show that the cost of producing is higher than when the decree was drawn and higher than a year ago, and also that the consumption of gas has diminished and the company is doing considerably less than its normal business.

## Ruling in the Wichita Natural Gas Case

Temporary injunctions which were in effect against the Wichita Natural Gas Company in the United States District Court preventing the gas company from raising rates on gas, were dismissed by Judge John C. Pollock. These cases were brought by a number of Kansas towns to prevent the pipe line company from increasing its rates to the distributing companies and thereby increase rates to consumers. The complaining cities and the Wichita Natural Gas Company will at the court's suggestion now go before the Kansas Public Utilities Commisison in an effort to agree on a rate that is fair alike to the gas companies and the consumers. The Newton, Kan., Gas Distributing Company now has pending before the Kansas Public Utilities Commission a case asking for a ruling on what is a fair rate to consumers for natural gas in Kansas. Other cities will not go before the commission with their cases until the Newton case is decided. Judge Pollock's ruling leaves the Kansas Public Utilities Commission without power to fix rates or to enforce its orders in the gas controversy. Under the action of Judge Pollock, jurisdiction in the gas cases remains in the Federal Court. The State Commission may hold meetings, but neither the cities nor the gas companies are compelled to abide by its rulings. Court review of the State Commission's orders may be had by either the cities or the Public Utility.

## St. Joseph Gas Company Granted Extension of $1.30 Rate

Notice has been received by L. V. Stigall, city counselor, that an extension of time in which the St. Joseph (Mo.) Gas Company may exact $1.30 per 1,000 cu. ft. for manufactured gas, has been granted. The limit of the period in which the gas company must show cause for charging $1.30 is made August 10. Under the original order of the commission, allowing an advance from the dollar rate and issued December 10, last, the company was given six months in which to show cause for the advanced rate.

## Old Gas Houses in Boston Pulled Down

The first building in New England to be actually pulled over by human force fell in the Consolidated Gas Company yards, North End, Boston. The building is one of the original tank houses erected nearly seventy years ago. Hundreds of residents of the North End who had been voicing their protests against the gasometers were interested spectators, when, with immense clouds of flying dust and loud crashes, the old gas house was brought to earth. The destroyed structure is one of six brick buildings torn down. Three double tackles were fastened to steel roof gripping the opposite gutter. Thirty men, 10 men to each tackle, manned the ropes, and the heavy steel roof was pulled from its walls, crashing to the ground below. The building was 130 ft. long, 70 ft. wide, and its highest point was 70 ft. from the ground. The company will sell the land to the city for playgrounds.

## Citizens Gas in Controversy Over Gas Main Extension—Company Must Make Extensions

Samuel Ashby, corporation counsel for Indianapolis, and Henry H. Hornbrook, attorney for the Citizens Gas Company, of that city, now are at work in an effort to straighten out the tangle in which members of the board of works and the gas company find themselves on the question of proposed gas main extensions to the Brightwood district, which is a partially suburban section of Indianapolis. Three mains have been ordered there and it has become known that sixteen will be petitioned for by the residents. The board wanted a main line laid in Sherman Drive, from Walnut Street to Twenty-eighth Street, to supply the district. J. D. Forrest, secretary and general manager of the company, contended that 11,221 ft. of new mains should be deducted from the 35,000 ft. the company's franchise compels it to lay annually. George Lemaux, president of the board, contended that the Sherman Drive extension would be a high-pressure pipe, supplying service already established, and therefore should not be deducted from the franchise footage of the company. Failing to reach an agreement on the subject the board and Mr. Forrest finally agreed to leave the question to their respective attorneys for solution. The gas main extensions, ordered by the Board of Public Works, however, must be carried out by the company.

## More Public Service Legislation Killed in Illinois Senate

Another measure which met its death in the Illinois Senate along with the "Home Rule Bill" was one providing for the validation of contracts entered into between individuals and public service corporations prior to June 30, 1919.

One of the reasons advocated for "home rule" for public utilities was that the commission of five members was unable to take care of all the matters properly coming before it, and that therefore such municipalities as Chicago were suffering from lack of adequate supervision of public service. The measure was rushed through the closing day or two of the legislature's work, and met its death with little or no attention being given to it.

## Minneapolis Company Maintaining Gas Supply in Spite of Strike

A. T. Rand, president of the Minneapolis Gas Light Company announces that although nearly the entire force at the company's plant went out on strike on June 12, and to date show no disposition to return to work, the city's supply of gas is being maintained by temporary shifts. The men left their work at midnight Wednesday, June 11. According to Mr. Rand, trouble arose when members of the gasmakers' union, which embraces about 70 per cent of the employees, asked that a committee of its members confer with officials regarding alleged grievances. This was denied on the grounds that the committee would not be representative of all employees. Mr. Rand said a committee from the union and nonunion men will be heard at any time. About 130 men are on strike, although a few have returned.

## Acetylene Gas Company Organized

The Texas Acetylene Company was organized at Cleburne, Texas, with a capital of $30,000. The following officers were elected and have made application for a charter: J. A. Muse, president; J. C. Blakeny, vice-president; R. A. Kelley, secretary and treasurer. The company will manufacture an acetylene gas generator patented by J. A. Muse of this city.

## Hearing of Los Angeles Case Put Over Until Fall

Following a conference of all the parties interested, Judge B. F. Bledsoe, the hearing of the case of the Los Angeles Gas & Electric Corporation and the Southern California Gas Company, against the city of Los Angeles to restrain the enforcement of the ordinance approved by the people at the general elections last November, compelling these corporations to use natural gas in their service pipes, was set for Tuesday, October 14, 1919. Judge Bledsoe said that he could not hear the matter before fall. He also said there were but two questions involved in the case, both technical. One was, whether the use of natural gas would present any unusual opportunity for accidents to the users of such gas; the second, was whether there was to be had a sufficient and constant supply of the gas.

## Pacific Gas and Electric Buys Northern California Power for $3,400,000

**Over $25,000,000 Spent in Acquisitions Since 1906—Company Now Reaches Clear to Oregon Line**

The board of directors of the Pacific Gas & Electric Company met to ratify an agreement by which this company will become the owner of the properties and assume the indebtedness of the Northern California Power Company. The stockholders of the selling company were also called together for a similar purpose. The price to be paid for the stock of the Northern Califonia Power is $34 a share, which means that the purchase of the company will cost Pacific Gas & Electric $3,400,000. By this transaction Pacific Gas & Electric secures some of the finest sites in the country. Northern California Power is now furnishing 30,000 horse-power and has machinery on the spot for 50,000. With the Pitt river development, 100,000 additional horse-power can be added. Northern California Power has been unfortunate in not being able to finance it necessary extensions.

Pacific Gas & Electric will undoubtedly be a great gainer by the acquisition of Northern California Power and the addition of its wonderful sites to its present holdings. Engineers are agreed in attributing great value to these sites, which, they say, are capable of wonderful development. By adding Northern California Power system to its own, Pacific Gas & Electric will reach clear to the Oregon line, links in the chain having been completed by the two companies during the last year. Since 1906 Pacific Gas & Electric has spent for acquisitions a total of $22,308,944, making, when the present deal is concluded, a total of $25,708,944. Construction work during the same period has amounted to $14,227,218. The value of its plants and properties now is given as $138,786,177, and its total assets $218,148,165.

The WILMINGTON GAS COMPANY'S statement for April submitted to the Public Utility Commission shows total revenue of $74,529.46; and cost of $53,961.89, net earnings $20,567.57, interest charges $17,975.77, surplus, April, $2,591.80. Deficit for ten months $54,391.36. Deficit of eleven months $51,799.56.

## Cleveland Studies Natural Gas Situation

Cleveland, Ohio, East Cleveland and Lakewood officials will take the first step toward preparing for negotiations with the East Ohio Gas Company for a renewal of its franchise when it expires early in 1921. The Cleveland council will be asked to adopt a resolution providing for the appointment of five to investigate the natural gas situation and report to council. This measure was introduced two weeks ago by Councilman Perry D. Caldwell and referred to the committee on public utilities.

## Decatur, Ill., Will Install Gas Tester

The city council of Decatur, Ill., is considering installing in Millikin University a gas tester for measuring the heat units of Decatur gas furnished by the Decatur Railway & Light Company. The quality of the gas furnished in Decatur has been questioned. At present there is no way of analyzing the fuel value in the gas.

## Utica Gas & Electric Employees Organize Club

The employees of the Utica Gas & Electric Company, feeling an organization would bring them into closer association and acquaintance, held a general meeting and organized the Gas and Electric Club.

E. S. Murphy as chairman of a previously appointed committee, presided at the meeting and reported on the constitution and by-laws appropriate for the operation of the club. The object, primarily, is beneficial; although the social feature will be encouraged. Members are assured of weekly payments in case of accident or disability, and in the event of death payments will be made to their dependents. Committees will be appointed to organize entertainments, outings and to have full direction of athletic events.

There was a large attendance at the meeting and close attention was given to the reading of the constitution, which was adopted unanimously and an election of officers and directors was held.

All employees of the company are eligible for membership and judging from the spirit and enthusiasm manifested, the success of the club is assured.

## Personal Notes

NELSON G. PHELPS, formerly connected with the industrial gas division of the commercial department of the Laclede Gas Light Company, of St. Louis, and now assistant chief engineer of the Under-feed Stoker Company of America, Detroit, Mich., was in St. Louis for a few days recently calling on old friends. During the war Mr. Phelps was associated with the Bureau of Fuel Conservation at Washington, D. C.

GEORGE W. LAWRENCE, of Greenfield, Mass., formerly general manager of the East Hampton Gas Company, at a meeting of the directors, was elected president and a director of the company.

PHILIP CABOT of Boston, Mass., formerly president of and a director in the East Hampton Gas Company, resigned his office.

## Construction Notes

### New Orleans Company Dredging Canal to Lay Pipes

Dredging and the putting in of piling over the Old Basin Canal at New Orleans, La., by the New Orleans Gas Light Company, to connect their line with the lower ends of the city will be completed by July 1.

John S. Bleecker, manager for the receiver of both companies, announced that the work had progressed to such a stage that the crossing of the Old Basin was necessary to bring the line into effect. "We will have to put a dredge into the Old Basin Canal," said Mr. Bleecker, "and then put sheet piling in to keep the water out while we cross with the pipe.

Work of laying the new gas main that will supply the lower section of the city is being pushed rapidly by the company.

The pipes were laid for a distance of over four blocks from the gas works and the project will be rushed, so as to be completed during the warm months, so that gas can be installed for the winter.

### Kingston, Ontario, Civic Utilities Will Install New $80,000 Apparatus

C. C. Folger, general manager of the Civic Utilities, embodying the light, heat, power and water departments of Kingston, Ontario, Canada, went before the finance committee of the city council of Kingston for the purpose of securing an appropriation to increase the capacity of the plant. He was successful in obtaining $80,000.00. This amount will cover the cost of a new set of purifiers, and a new carbureted water gas set, with exhauster and auxiliary appliances capable of handling 500,000 cu. ft., which apparatus will very soon be installed.

### Michigan Gas Puts in Service New "Bench" of Retorts

The Michigan Gas & Electric Company is installing a complete furnace recuperation and retorts at their Three Rivers plant. Upon placing this additional "bench" of retorts in service the company will have a total of twelve retorts available for the manufacture of the city's gas supply.

### Buffalo May Build Artificial Gas Plant

The Iroquois Natural Gas Company, of Buffalo, N. Y., has made a statement that it cannot make any new connections because the company has not the gas, and that there is a possibility the company will have to ask the Public Service Commission for authority to disconnect 15,000 Buffalo consumers, because the Peoples Gas Company of Pittsburgh cannot sell the Iroquois any more gas.

Buffalo is growing very fast. Houses for newcomers are at a premium, yet the building of residences is being held back because the Iroquois company cannot guarantee connections. There are now some 300 new homes that cannot get connections, and builders and financiers are holding up proposed construction of houses on that account. Business men think the situation serious, and are advocating the city do something in the way of providing a surplus supply of gas, without which Buffalo and the frontier cannot expand, as it is expected to do within the next decade.

Frank B. Baird of the Buffalo Union Furnace Company testifying for the city in the Iroquois gas hearing, stated that it would be a great thing for Buffalo to go into the gas business and produce coke. He said it would make this city one of the big steel industry centers of the country. He also said that it would be a great boom for Buffalo and the frontier and increase manufacturing.

Recently a gas plant expert of the Kopper's Company of Pittsburgh estimated an up-to-date municipal gas plant with a capacity of 7,000,000 cu. ft. every 24 hours, built to increase its capacity 100 per cent would cost the city about $3,500,000.

Public Works Commissioner Kreinheder said that the proposition to have the city establish a municipal gas plant is being investigated.

The erection of the by-product coke ovens at the Donner Steel plant, Mr. Kreinheder said, is being completed, notwithstanding the fact that the war has ended. This may make available a supply of gas. The commissioner also said he had been informed that improvements to the equipment of the old Buffalo gas plant are being made.

### Wabash Gas Erecting Plant at Robinson, Ill.

The Wabash Gas Company has closed a deal in Robinson, Ill., whereby they become the owners of the tract of ground, containing about two acres at the junction of the two railroads, occupied by a sawmill. The Wabash Company some time ago purchased a large gas storage tank, but shipment was delayed for the want of a location for its erection. The foundation for the tank, which will be 66 ft long and 12 in diameter, has already been laid, and work on the erection is now about completed. For the present the laying of the gas line to connect with the line from the Vincennes artificial gas plant has been abandoned and next year there is a possibility of there being erected a plant in Robinson to manufacture gas and supply the whole county. If such a plant is to be built there will be plenty of room on the ground secured for its erection.

In the meantime plans are being laid to give Robinson a strong pressure of gas for the coming fall and winter. The pump station now in operation at New Hebron, is to be moved south from there in the center of a large gas pool which the Wabash has purchased, and more pump power is to be added to that district. It is figured that enough gas pressure can be maintained in the storage tank by the use of the strong pressure pumps to keep up a good supply all winter.

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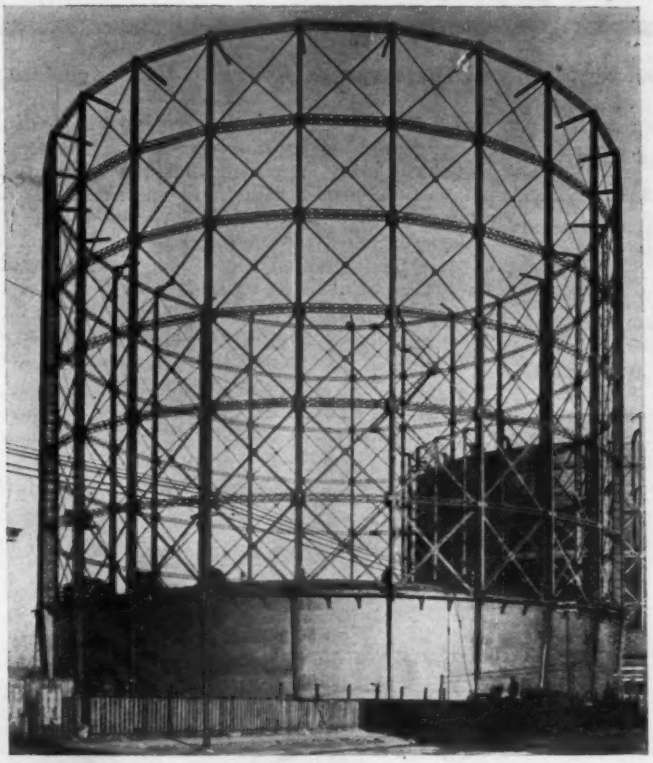

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TWENTY YEARS EXPERIENCE **GAS HOLDERS** HAS TAUGHT US HOW

STEEL CONSTRUCTION OF ALL KINDS

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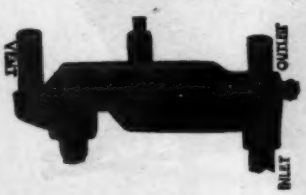


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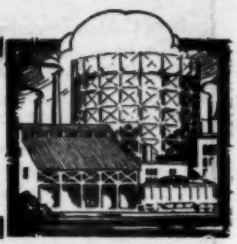


**Conducted by Business Department of American Gas Engineering Journal**

## Monel Metal Meter for Measuring Oxygen and Corrosive Gases

The Wet Type Monel Metal Meter is an apparatus that has been found satisfactory for the measuring of oxygen and corrosive gases.

In general construction they are the same type as the Laboratory Test Meters. The cast, drum and all parts coming in contact with the gas are, however, made of Monel Metal.

This metal is a natural alloy composed principally of nickel and copper. It is non-corrosive and is not readily affected by gases. It is about equal in weight to copper but is as strong as the best rolled steel.

The meters consist of a cylindrical case, which is filled with water to the point indicated on the water guage. Within the casing is the measuring drum. This is of improved design, the various compartments being so constructed as to permit the drum to revolve freely without fluctuation. The drum revolves on a horizontal axis which projects through the front of the casing, passing through a stuffing box, and is connected with the indicating mechanism of the meter.

All meters are fitted with a standard water-line gauge, two spirit levels, fine grade thermometer, two thermometer sockets 6 in. syphon pressure guage, leveling screw feet, and an improved index. The index registers from one hundredth part of a cubic foot to 10,000 cubic feet and in the larger sizes from one-tenth of a cubic foot to 100,000 cubic feet. The pointers are made with ground slip joints, so that they can readily be set back at zero, if desired, after running a test.

The larger meters are set on a hand-made wrought iron base. This is not only for strength but allows a free circulation of air around meter and permits it to be easily cleaned.

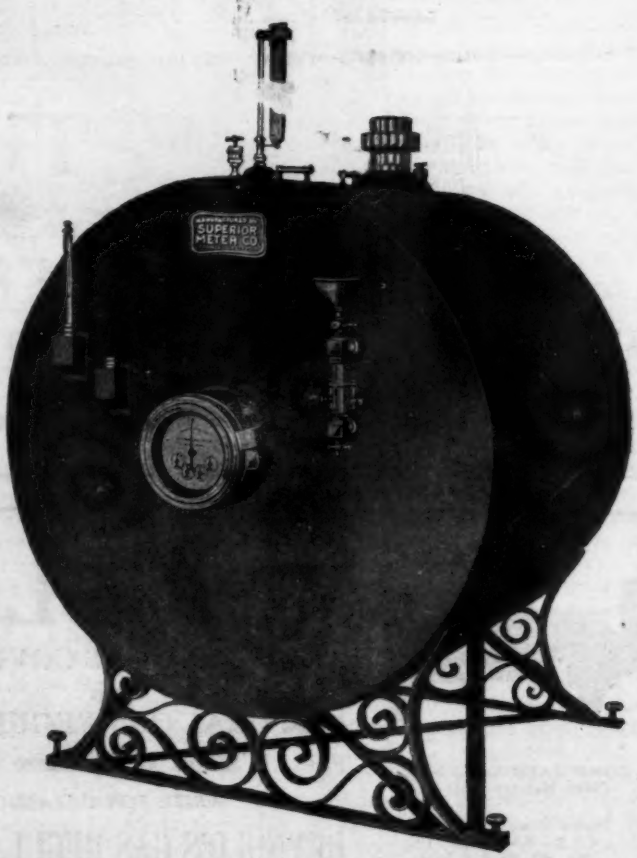
They are made in all sizes up to and including 1,000 cu. ft. per hour.

The Superior Meter, Bush Terminal, Brooklyn, N. Y., are specialists in manufacturing this type meter and have been supplying them to many of the largest plants in this and other countries. Many of the largest manufacturers of oxygen apparatus have standardized on these meters. They are installed in a number of Government plants, including various navy yards and the army balloon school.

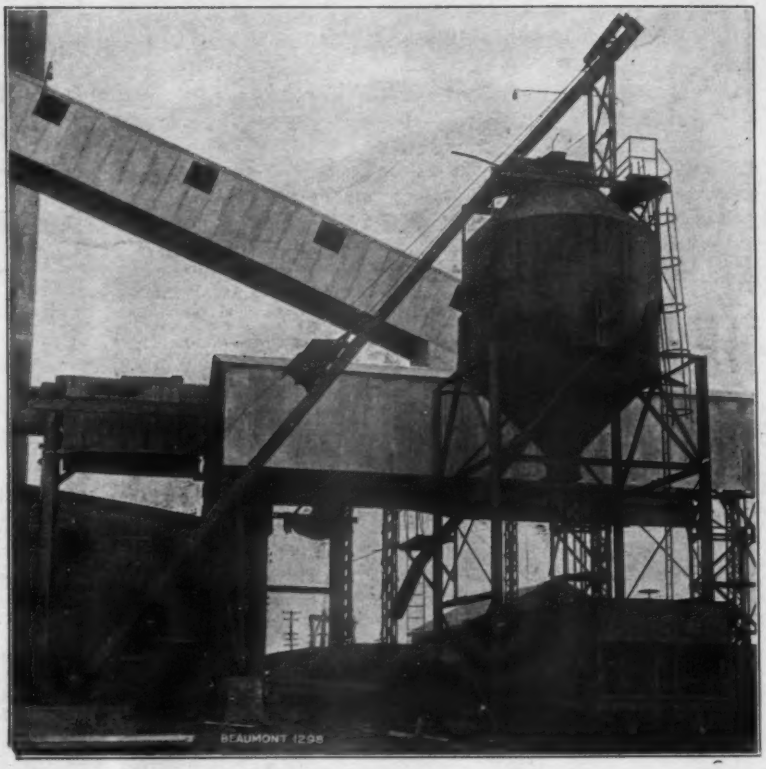
## Tables of Producer Gas Costs

The Steere Engineering Co., Detroit, Mich., are sending out a table of "Producer Gas Costs," which includes fuel, power, repairs and maintenance, labor and supervision, interest and depreciation. The tables are arranged on the basis of 1,000 cu. ft. of coal costing from $2 to $6 per ton at the plant, and gives cost also of the hot raw producer gas at off-take and clean cold producer gas. These figures cover natural gas, fuel oil per gallon, coal gas or carbureted water gas and blue gas.

These tables are printed on heavy cardboard, punched at the top so that they can be hung in a convenient place for reference. A card will be sent by the company on request.




NEW TYPE MONEL METAL METER

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COMPLETE GAS WORKS INSTALLATIONS
STEEL TANKS

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They said Columbus would not find a new world when he sailed west—but he did.
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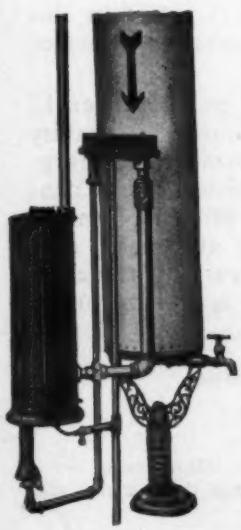

Gas men have said it was an impossibility to light the burner of any make of small gas water heater without "back-flash" and without the aid of any kind of flame check—but The

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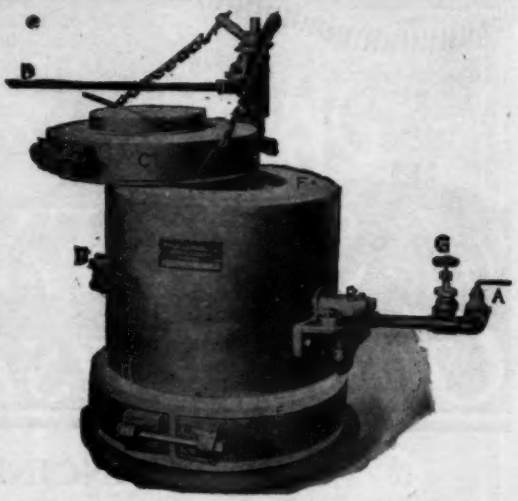


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It is tremendously vital to your interest to immediately investigate the following distinct advantages possessed by an installation of

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Do you know that WATER GAS can be PRODUCED and ENRICHED in this type retort with our patented enriching device, cutting out costly operation of water gas sets in localities demanding a high candle power gas.

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**Can Be Installed on Old Benches as Well as New**

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## *Begin now to plan for it!*

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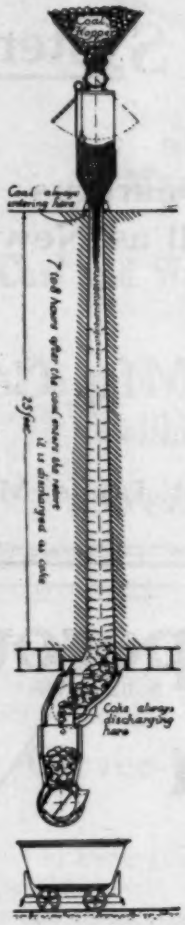


Retorts heated by gas generated by carbonization. Coke discharged below the ignition point. Waste heat in coke and gases utilized to generate steam.

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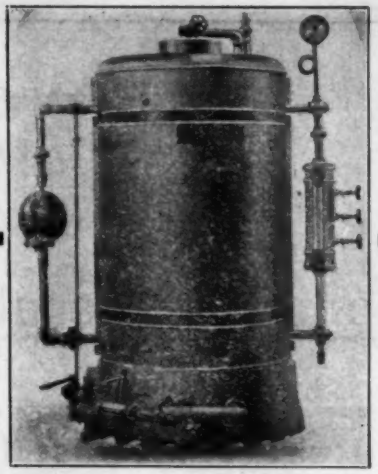

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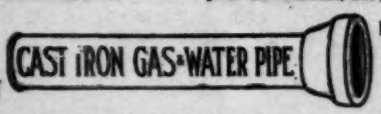

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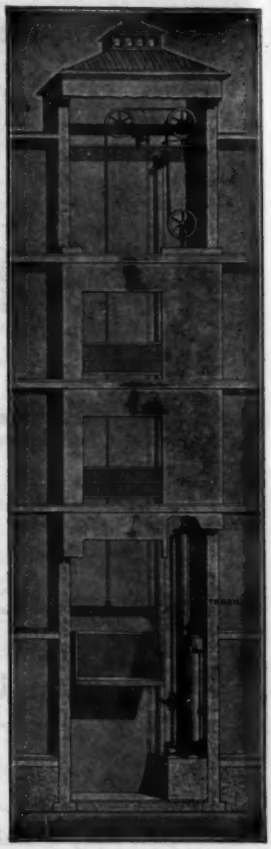

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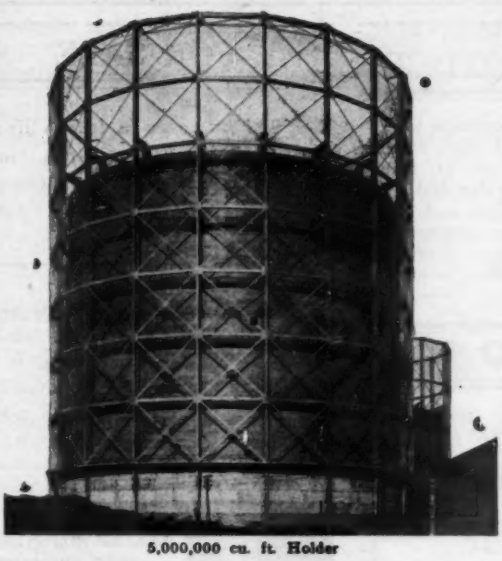

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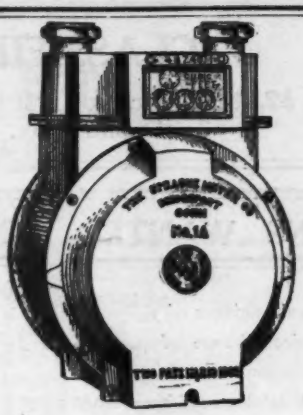

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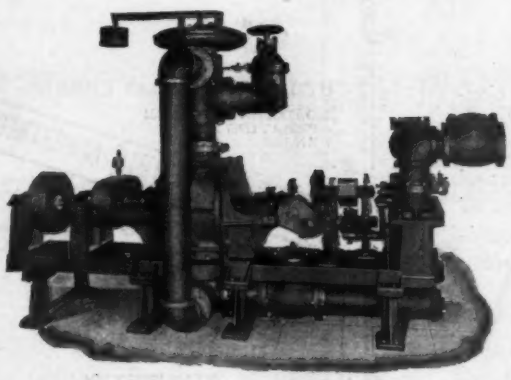

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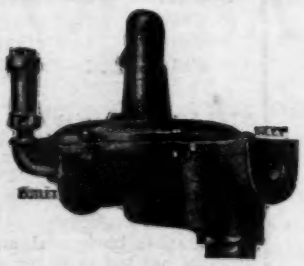

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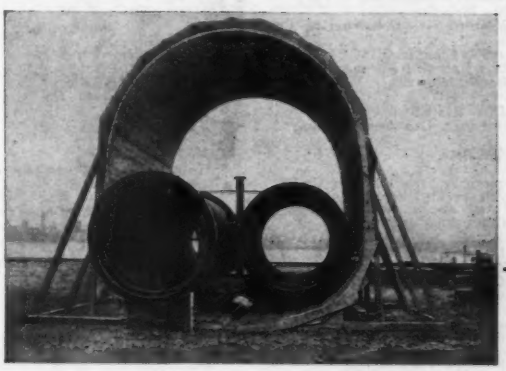

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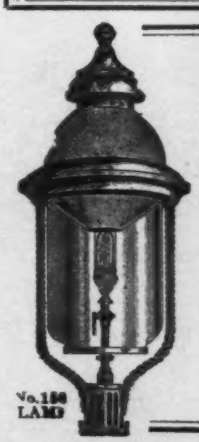


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Davis & Farnum Mfg. Co.
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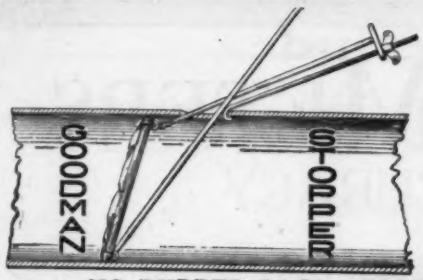
Isbell-Porter Co.
Ludlow Valve Mfg. Co.
Stacey Bros. Gas Constr. Co.
Stacey Manufacturing Co., The
Steere Engineering Co.
Western Gas Construction Co.
Wood & Co., R. D.
Lamp
Welsbach Co.
Oil, Steam and Water
Ludlow Valve Mfg. Co.
Back Pressure
Chaplin-Fulton Co.
Connelly Iron Sponge & Gov. Co.

**WASHERS**
See Purifiers

**WASTE HEAT BOILERS**
United Gas Improvement Co.
Western Gas Construction Co.

**WATER GAS APPARATUS**
Bartlett-Hayward Co.
Connelly Iron Sponge & Gov. Co.
Davis & Farnum Mfg. Co.
Gas Machinery Co.
Stacey Manufacturing Co., The
United Gas Improvement Co.
Western Gas Construction Co.

**WATER HEATERS**
Long-Landreth-Schneider Co.

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# ASSOCIATION MEETINGS

**SOCIETY OF GAS LIGHTING.**
Annual Meeting—Dec. 11, 1919.
President, Alex H. Strecker
Secretary, George G. Ramsdell, 128 E. 15th St., New York City.

**NEW ENGLAND ASSOCIATION OF GAS ENGINEERS.**
Annual Meeting—Boston.
President, Albert M. Barnes.
Secretary, N. W. Gifford, East Boston, Mass.

**WISCONSIN GAS ASSOCIATION.**
Annual Meeting—Milwaukee.
President, Bruno Kahn.
Secretary, Henry Harman, Milwaukee, Wis.

**ILLINOIS GAS ASSOCIATION.**
Annual Meeting—Chicago, March 17-18, 1920.
President, H. S. Whipple.
Secretary, H. H. Clark, 72 W. Adams St., Chicago, Ill.

**SOUTHERN GAS ASSOCIATION.**
Annual Meeting—Norfolk, Va.
President, Noble L. Clay.
Secretary, M. A. Bowlin, Macon, Ga.

**PENNSYLVANIA GAS ASSOCIATION.**
Annual Meeting—Philadelphia, Pa., 1920.
President, George S. Speaker.
Secretary, Louis R. Dutton, Jenkintown, Pa.

**NEW JERSEY STATE GAS ASSOCIATION.**
Meeting—Three times a year.
President, Charles W. Hay.
Secretary, William P. Adams, Millville, N. J.

**INDIANA GAS ASSOCIATION.**
Annual Meeting—Indianapolis, Ind.
President, R. A. Zeigler.
Secretary, E. J. Burke, Indianapolis, Ind.

**IOWA DISTRICT GAS ASSOCIATION.**
Annual Meeting—
President, George D. Roper.
Secretary, H. R. Sterrett, 412 W. 7th St., Des Moines, Iowa.

**SOUTHWESTERN ELECTRICAL AND GAS ASSOCIATION.**
Annual Meeting—
President, Burr Martin.
Secretary, H. S. Cooper, 403 Slaughter Bldg., Dallas, Tex.

**NATURAL GAS ASSOCIATION OF AMERICA.**
Annual Meeting—Cleveland, Ohio
President, Kay C. Krick.
Acting Secretary, Thomas C. Jones.

**CANADIAN GAS ASSOCIATION.**
Annual Meeting—Niagara Falls, Canada, Aug. 21-22, 1919.
President, C. C. Folger.
Secretary, George W. Allen, Toronto Gas Company.

**PACIFIC COAST GAS ASSOCIATION.**
Annual Meeting—Los Angeles, September, 1919.
President, John D. Kuster.
Secretary, Henry Bostwick, 445 Sutter St., San Francisco, Cal.

**MICHIGAN STATE GAS ASSOCIATION.**
Annual Meeting—September, 1919.
President, Samuel Ball.
Secretary, Albert G. Schroeder, Grand Rapids, Mich.

**AMERICAN GAS ASSOCIATION.**
Annual Meeting—New York, Oct. 13-18, 1919.
President, George B. Cortelyou.
Secretary,

**EMPIRE STATE GAS ASSOCIATION.**
Annual Meeting—New York, Oct. 13-18, 1919.
President, E. H. Palmer.
Secretary, C. H. B. Chapin.

**TEXAS GAS ASSOCIATION.**
Annual Meeting—Houston, Tex., Oct. 14-15, 1919.
President, W. H. Sedberry.
Secretary, C. H. Seidenglanz, Dallas, Tex.

**ILLUMINATING ENGINEERING.**
Annual Meeting—Chicago, Ill., October, 1919. President, George A. Hoadley, Swarthmore, Pa. General Secretary, Alarence L. Law, Irving Pl. and 15th St., New York City.
Chicago Section—Chairman, A. O. Dicker, Chicago, Ill. Secretary, E. D. Tillson, 28 N. Adams St., Chicago, Ill.
New England Section—Chairman, H. F. Wallace, Boston, Mass. Secretary, H. W. Jordan, 39 Boylston St., Boston, Mass.
New York Section—Chairman, F. M. Feiker, New York City. Secretary, R. E. Harrington, 5th and Sussex Sts., Harrison, N. J.
Philadelphia Section—Chairman, James D. Lee, Philadelphia, Pa. Secretary, H. B. Anderson, 1931 S. 9th St., Philadelphia, Pa.

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Diaphragm does not touch at top, bottom or sides

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Meters Repaired and Proved
Prepayment Meters
Station Meter Work of Every Description

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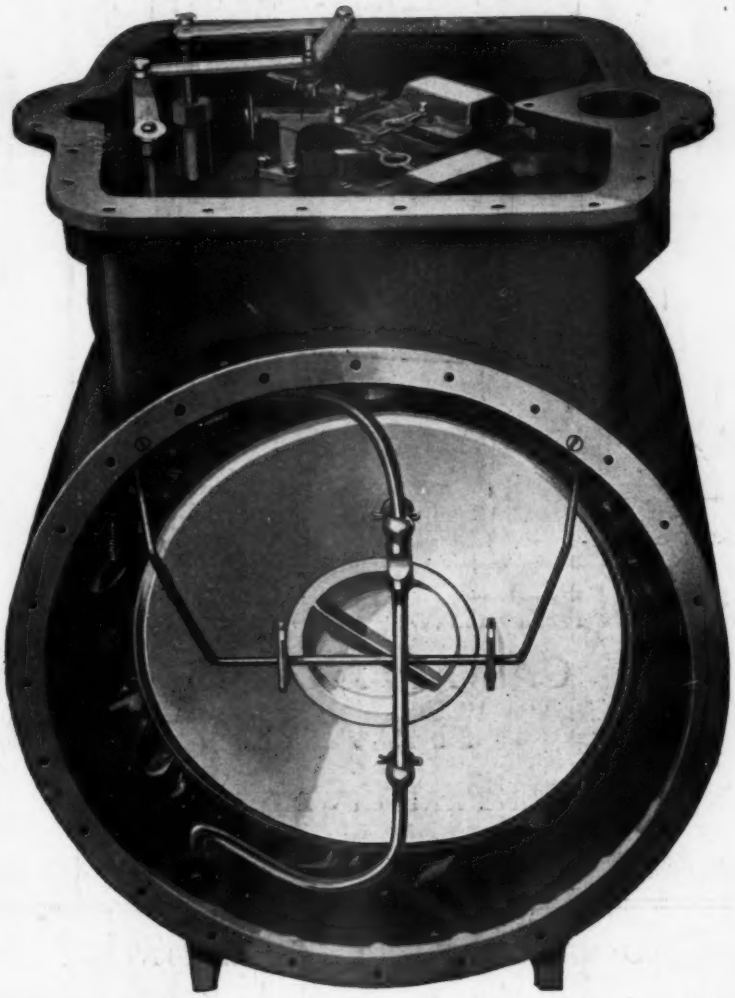

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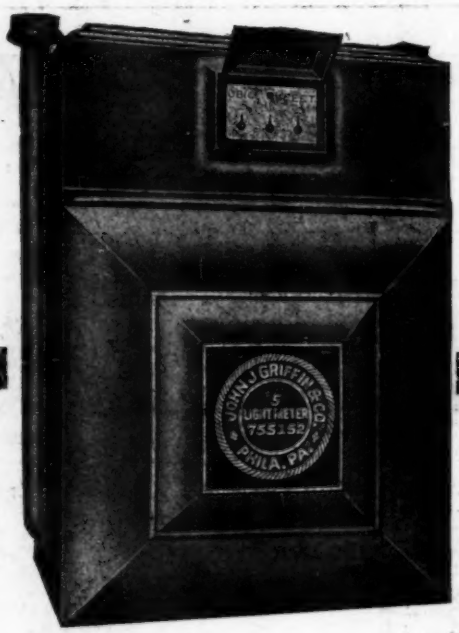


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